A Database Publication

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Volume 6
Number 2
April 1988
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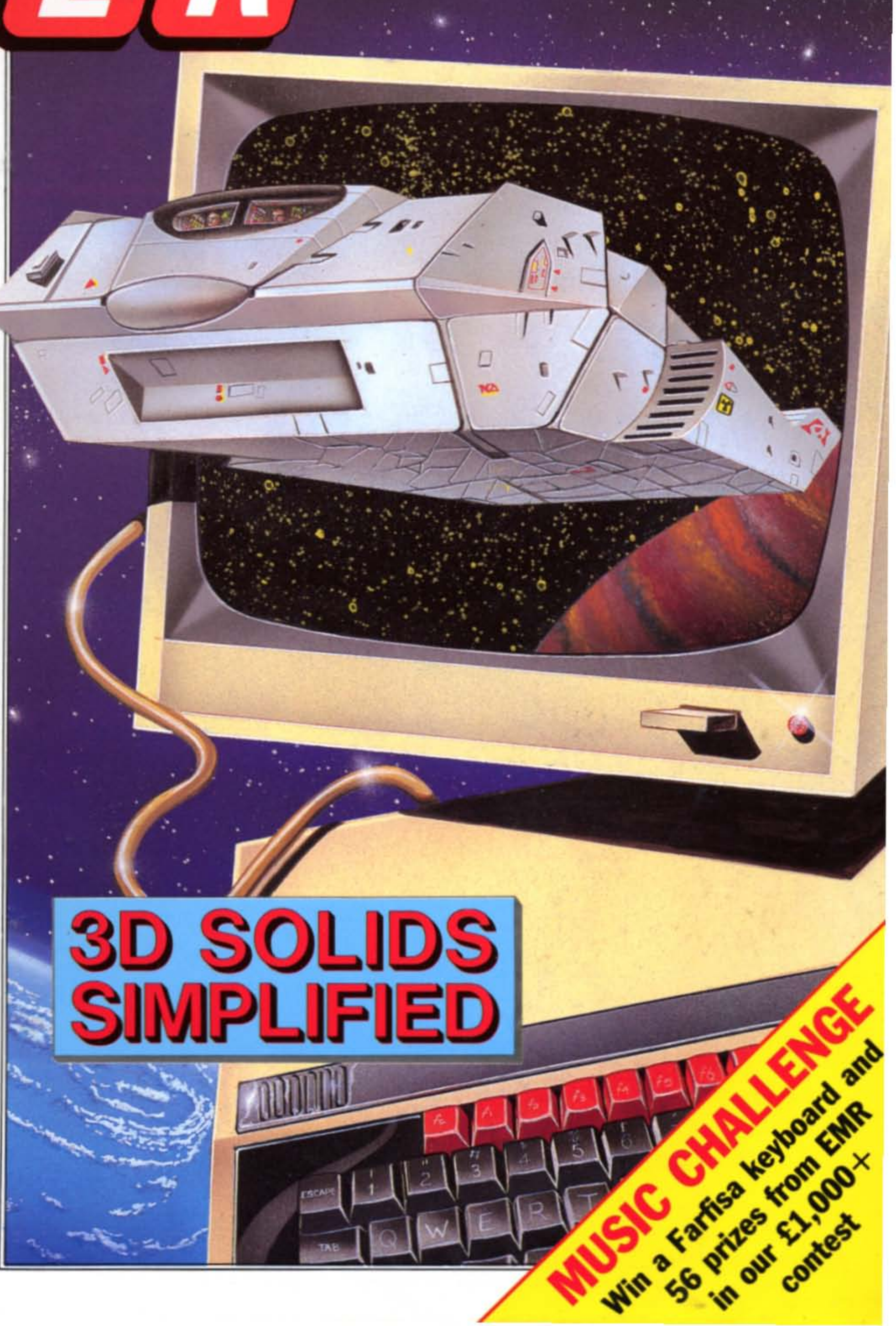

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THE MICRO USER
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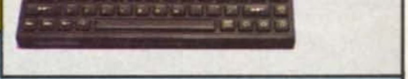

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THE MICRO USER

May 1988 issue on sale April 6th

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A307

THE MICRO USER NEWS

Acorn supremo pins his hopes on Archimedes

Lord Young, the Trade and Industry Secretary, was shown the powerful graphics capabilities of Acorn's Archimedes computers on the first day of the Which Computer Show. On his right is Acorn's new managing director, Harvey Coleman.

ACORN's newly appointed supremo Harvey Coleman is currently working on a master plan to take the company to even greater heights than in its heyday with the BBC Micro.

Whithin hours of moving into the hot seat of managing director at the Cambridge headquarters he had developed a provisional strategy based primarily on the Archimedes.

The first stage will see Acorn use the machine to consolidate its already formidable power base in education.

From there, Harvey Coleman intends to exploit the MSdos emulation capabilities of the machine to make inroads into the business community.

And the final stage of the corporate plan will see an attack on niche markets, pushing the Archimedes as the all-powerful computer that can offer real solutions.

"I'm very excited about what I've found at Acorn", Harvey Coleman told *The Micro User* in an exlusive interview. "After all, who else starts by designing their own chips?"

The new managing director sees his new job as a tremendous opportunity. He also admits to being very impressed by the number of companies that have jumped on to the Archimedes bandwagon.

"There are currently 500 development machines out there," he said, "and that's a vote of confidence in itself".

The final word from Harvey Coleman – for the moment – suggests that Acorn will be taking a long hard look at its pricing policy.

"We have to be a sufficient percentage cheaper than the competition", he said.

HEADING FOR BIG SHOPPING SPREE

A SURVEY of exhibitors attending the Electron & BBC Micro User Show at UMIST, Manchester, has revealed that visitors are in for a £100,000 plus shopping bonanza.

That's the total of special offers being made available by the 70 standholders.

"Competition at the shows is becoming increasingly fierce", admitted one leading company. "So we are being forced to cut our profit margins to the bone. And that means it will be a field day for users".

Before the show exhibitors are cautious about revealing just what prices will be slashed, but discounts as high as £50 in some cases are likely.

Apart from offering the opportunity of a shopping spree of a lifetime, the Manchester show this time transports visitors into the exciting world of adventuring.

This is thanks to the presence of The Spirit of Adventure group, which regularly acts out medieval quests. On this occasion, the members are disguised as a selection of creatures from minotaurs to wizards.

Visitors have the chance to play hero or heroine, battling against magical forces and monsters, under the guidance of Britain's top role-playing specialists.

All this plus the constant availability of the country's leading BBC Micro experts on hand to answer all technical questions.

A money saving advance ticket order can be found on Page 6.

City venue

The stage is also set for the Electron & BBC Micro User Show to return to London.

The next event in the series will return to the New Horticultural Hall from May 13 to 15.

Awkward questions answered

A COMPUTER consultancy service for frustrated BBC Micro users in the London area has been launched by Micro Advisory Services.

Aim of the new company is to demonstrate the full potential of the computer to users who are having difficulty understanding the manuals that accompany software packages.

"Many people bought the BBC Micro for their children with the intention of using it themselves some day", said Anthony Kay, director of Micro Advisory Services (01-878 7044).

"However, once they have the computer up and running they often don't realise that there is a good deal of reading to do in order to use the machine for anything more serious than games".

For a maximum of £25 an hour Micro Advisory services will help to provide the answers to questions that tend not to be raised in the manuals.

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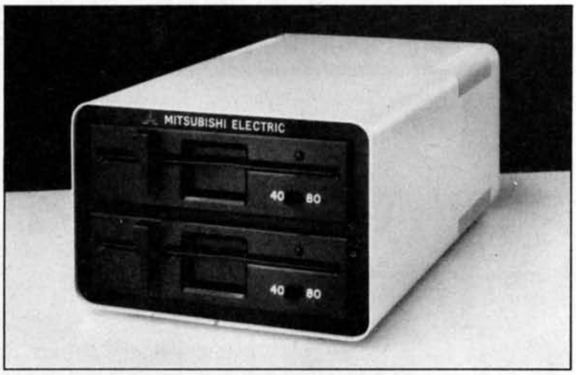

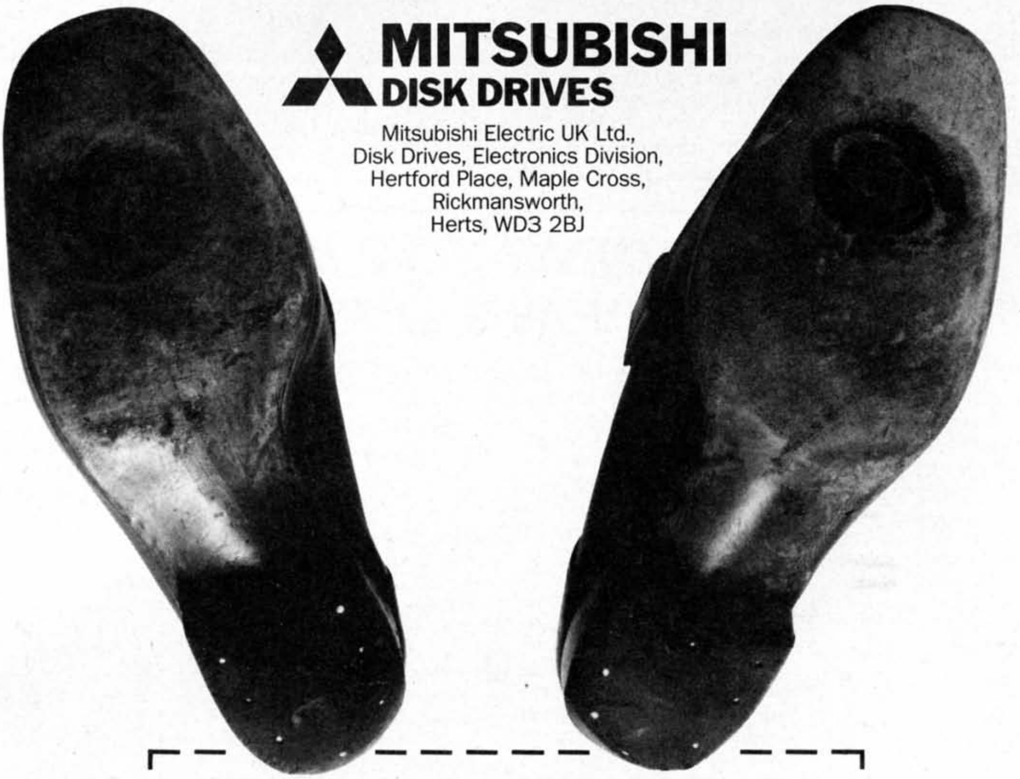

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NEWS

Enter the Russians

WHAT is thought to be the first computer game from Russia for the BBC Micro – Tetris – has been released by MirrorSoft.

The package is claimed to be simplicity itself. A series of different shapes appear onscreen one at a time: By using keyboard or joystick you have to move and turn them – and ideally make them fit together in a line across the bottom of the screen.

As your skill level increases the shapes appear more rapidly. MirrorSoft (01-377 4837) is so confident that Tetris will attract a cult following that it is organising a national competition with a first prize of a trip for two to Russia.

Price £8.99 on cassette and £12.99 on disc.

Multi-hued for Master

A RANGE of colourful 3.5in double sided 135 tpi discs for the Master Compact has been launched by Centec Electronic Systems.

The red, yellow, green, orange and blue discs complete the Centec Rainbow series. Prices range from £14.49 for 10 to £169.95 for 200.

Centec (0689 35353) has also launched the budget-priced Disc Bank range of storage boxes for 3.5in and 5.25in floppy discs.

Combined up

A consortium of local education authorities in Yorkshire and Humberside is marketing utilities which allow modification of BBC Micro programs to run under the 6502 emulator on the Archimedes.

The package has been created by Acorn and is being sold by the consortium – Resource (0302 63800) – on its behalf.

Mandarin, a new name in superior software

A MAJOR international publisher has joined forces with a new software house to launch an exclusive entertainments label for the BBC Model B, B+ and Master.

To be known as Mandarin, it will combine the marketing muscle of The Europress Group, parent company of Database Publications and a crack new team of games writers known as Powerhouse Software – plus a £1 million budget.

And the end product aims to be exclusive games for the discriminating player.

"We believe that Powerhouse Software's programming skills, together with Mandarin's knowledge of the marketplace, its abilities in printing and packaging, and its understanding of the need to get products out on time, will be an unbeatable combination", says Steve Benfield of Powerhouse.

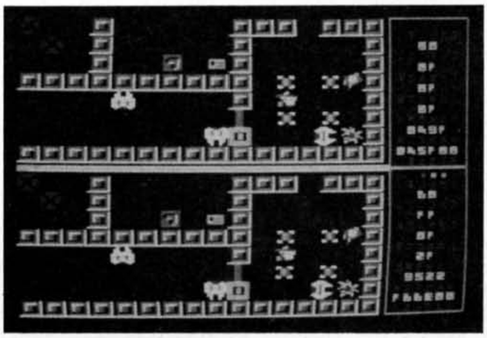
Mandarin's involvement with the innovative games software house will be the first of a series of joint ventures.

"We find ourselves in the position that, unlike many other publishers, we don't have to rush out titles to maintain cash flow", says Chris Payne, spokesman for the new venture.

"Mandarin couldn't be more sound financially – we have £1 million in the kitty – so we are in a superb position to pick and choose not only our partners but also just what products we decide to release.

"It is our aim that our label will become synonymous with quality, providing the Rolls Royce of software games.

"And what better way to start than with the brilliant new team at Powerhouse".



THE first package to be released by Mandarin in association with Powerhouse will be Icarus, a spectacular space adventure game for one or two players, devised by Julian Avis, author of best-seller Dunjunz.

Its scenario sees the Starship Icarus plummeting towards the Sun, and the only hope of averting the impending cataclysm is for the player to teleport on board and regain control. The fast-action game has 20 levels of excitement, with a unique split screen facility which means that a player can compete on his or her own or enlist the help of a friend.

In all, the Powerhouse team spent three months coding, followed by three months of testing, to create Icarus.

Icarus, released on March 16, is available for the BBC Model B, B+ and Master. Price £9.95 on cassette, £11.95 on disc.

Trophy for Nova

RUNNING a successful business doesn't leave much spare time – but Minerva Systems' boss Nova Fisher found enough to come through the first heat in the Young Career Woman of the Year contest with flying colours.

And that meant a cash prize of £50, and the award of the Sylvia Hicks trophy.

The contest, sponsored by the National Westminster Bank, is far from being a lightweight affair.

In addition to a half-hour interview by a panel of judges, Nova had to make a presentation in front of an audience which included local dignitaries and businessmen.

Nova, who set up Minerva Systems just over two years ago, now has to face further heats in Exeter and London, and is hoping for a place in the finals – and the £1,000 first prize.

Minerva Systems also seems set for a hectic future. The company has just split into two distinct arms – Minerva Software and Minerva Computers – to cope with a rapidly expanding volume of business.

Minerva has the Acorn dealership for Devon, and is currently busy coping with the demand for the Archimedes. "We're shifting them like they're coming out of our ears", said Nova.

Nova Fisher, Minerva Systems boss

Co-processor put on ice

By CHRISTINA ERSKINE

ACCORDING to Acorn, its software MS-dos emulator for the Archimedes has proved so successful that the company has now put development of the hardware 8086 co-processor on hold.

Acorn's market research apparently shows that those who are using their MS-dos emulators are satisfied enough with them to show little interest in purchasing the hardware version should it become available.

"The question now is, should we now go for a 286 or 386 hardware co-processor instead?" says Michael Page of Acorn.

Part of the "problem", aside from the efficiency of the existing emulator, is the price. The planned co-processor would have cost around £300; the current software version is just £60 if bought with the machine. Archimedes' main market at the moment is the not notably wealthy education sector.

It must be slightly galling, to say the least, for Acorn, that MS-dos compatibility should be so important – and perceived as a success – to the machine. On speed alone, the PC emulator slows it down considerably.

Given the other attributes of the Archimedes, it seems something of a waste of the machine to use it to crank out PC software standards, some of which is ancient, and some of which was never famous for ease of use and flexibility.

Yet, ironically, it is the existence of MS-dos compatibility that will attract buyers – who hopefully, will find out about the rather more exciting facets of the Archimedes before too long.

For Archimedes is having a bit of an identity crisis at the moment – too expensive and sophisticated for the home, too untried and untested for the business market. At the moment, it's a little of education and rich Zarch fanatics.

Acorn's MD, Harvey Coleman, has plenty of ideas for applications for the Archimedes and can reel them off without pausing for breath – education, definitely, more games, why not? Unix in the next few months, the not-so-computer-literate who needs the easy user interface, the highly computer literate who wants fast powerful processing in number crunching and graphics fields.

In order for all these users and potential users to sit up and take it seriously, however, it will have to continue to be sold with the MS-dos option, at least in the short term.

Coleman says there are more than 500 development machines with hardware and software companies at the moment.

Even if only half of them produce something by the end of the year, that's still a good basis upon which to build a decent dedicated software library.

Lectures on the line . . .

UNIVERSITY lectures could become a thing of the past if Project Granta, currently under development at Cambridge University, becomes a reality – and the Archimedes is set to play a major role in the transformation.

The university has plans to greatly extend the use of computer workstations. It is looking forward to a future where lectures and seminars could well be replaced by Email and online exchanges, with users linked by a fibre-optic network covering Cambridge.

Individual departments will decide which computers best suit their needs, but the Archimedes – with its power and rapidly expanding software base – is likely to be a popular choice for the new network.

And although the project is still only at the planning stage, Cambridge has already signed an agreement to buy up to 1,000 Archimedes over the next five years.

The project is expected to cost more than £7 million,

440 IS ACORN'S POWER HOUSE

A POWERFUL addition to the Archimedes range has been launched by Acorn.

The new Acorn 440 combines the advantages of 32-bit, high-speed processing with additional expansion capability, 4Mb of on-board ram, high resolution display, and a built-in 20Mb hard disc.

BBC Basic V and industry-standard high level languages including Fortran, C, Pascal and Lisp are supported by the new machine. An MSdos emulator for the 8088 family is also available.

Harvey Coleman, Acorn's managing director, said: "The power and versatility of the 440 opens up important new markets. We expect interest from users with business applications, software developers, colleges and universities".

Because of a supply shortage it is going to be a while before adaquate quantities reach the shops. Price £2,299

STRANGE things are happening at Micronet – most of the staff have gone into the black.

That's no reflection of the state of their bank accounts, however, just a recognition of the taste they've acquired for Cambridge Computer's Z88 – the Micronet office now boasts six of the machines, which can be easily linked to the BBC Micros they use for editing Micronet pages.

Editorial director Simon D'Arcy is now firmly hooked on batteries, and Microbase editor Sean Solle won't be parted from his "supertwist dream machine".

Master manual arrives

AN ADVANCED reference manual for the BBC Master has been released by Watford Electronics (0923 37774). The manual was initially promised by Acorn, but the company never got around to producing it.

However, following an agreement with Acorn, the manual has been completed and published by Watford. Price £19.95.

Blow for data

THE ability to enlarge and project computer data direct from the BBC Micro is now possible with a new interface from Steljes (01- 602 9456).

Until now LCD data projection had been limited to IBM compatible computers. But demand from education establishments for a similar system prompted the company to produce the device.

A Sharp QA-25 LCD panel is connected to the BBC Micro via the interface, the panel is then placed onto the light box of an overhead projector. All data sent to the LCD screen is then projected. Price £799.

BEEBUG

For users of the BBC Micro, Master and Compact

RISC USER

For Archimedes users

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BEEBUG

The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information to beginners and experts alike.

RISC USER

This is the magazine for anyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes, it does not contain modified programs originally intended for the Model B or Master.

BEEBUG and RISC User are both published 10 times a year and are only available on subscription, not through the shops.

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BBC Cable if purchased separately is £8.00. Software on its own: £11.00 + £1 p&p.

NEWS

Archimedes boom forecast

ROB Pickering, boss of leading supplier for Acorn machines Computer Concepts, is forecasting a boom this year in products for the Archimedes.

"There is little doubt that Acorn has developed a machine which will once again account for a major slice of the market", he said.

"There may be little software available for the Archimedes at present, but by the end of the year that will have changed.

"Indications show there are some really good packages on the way for the machine, although the timescales are not so exciting".

His own firm has produced a rom podule and conversions of existing BBC Micro packages. "However, these run under the 6502 emulator and can by no stretch of the imagination be seen as demonstrating the Archimedes' power", he admits.

But Pickering promises: "This year the scene is set to change dramatically. There are at least five word processing or desktop publishing packages for the Archimedes under development in the UK.

"In the longer term we can expect to see the ability to drive laser printers and typesetting machines direct.

"Its ability to handle interrupts quickly, together with a good add-on interface, makes the Archimedes ideal for industrial control and scientific applications.

"An available Midi interface and software will ensure its use in music. Good graphics open up a wide range of possibilities in CAD, art packages, video titling and other creative areas".

MONITOR WINNER

IN the October 1987 issue of *The Micro User* there was a listing for the Microworks Screen Designer – and we asked you to improve this program by adding some procedures of your own.

The programs we received were full of innovative and useful ideas and improvements – from a pixel editor to mode changes, flips, and colour inverse.

The overall winner, and recipient of a Taxan Supervision 625 colour monitor is David Rhodes, who comes from Leicester.

Z88 comms link-up

A NEW cartridge from Wordmongers allows Z88 owners to logon to an increased range of online services, including MicroLink/Telecom Gold and Micronet.

Wordmongers (0296 437878) has been producing Z88 comms cartridges for some time, offering scrolling text facilities – now ZTerm, a modification of an existing package, adds the capability of viewdata terminal emulation.

ZTerm also supports Ascii file upload and capture, and Xmodem comms protocol.

At the moment, graphics are represented by asterisks, and the 23-line Prestel screen can only be viewed by windowing on the Z88's eight-line display.

Wordmongers is considering the possibility of adding monochrome graphics, but a more likely candidate to fit into the small space remaining – depending on response from users – is a facility to prepare mailboxes offline.

Price £49.99.

THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	TAPE PRICE
1	▲5	**STAR WARS** *Domark*	9.95
2	▲7	**WINTER OLYMPIAD** *Tynesoft*	9.95
3	▼2	**PLAY IT AGAIN SAM** *Superior*	9.95
4	▼1	**LIFE OF REPTON** *Superior*	6.95
5	▼3	**LEAGUE CHALLENGE** *Atlantis*	2.99
6	▲11	**10 COMPUTER HITS VOL 4** *Beau Jolly*	9.95
7	▲10	**SPELLBINDER** *Superior*	9.95
8	▼4	**GRAND PRIX CONSTRUCTION SET** *Superior*	9.95
9	▼8	**SURVIVORS** *Atlantis*	2.99
10	▲13	**BONECRUNCHER** *Superior*	9.95
11	●	**TRIPLE DECKER** *Alternative*	1.99
12	▼9	**PALACE OF MAGIC** *Superior*	9.95
13	▼6	**SPITFIRE 40** *Mirrorsoft*	9.95
14	▲15	**FIVE STAR GAMES 3** *Beau Jolly*	9.95
15	▲20	**SPY VS SPY** *Tynesoft*	9.95
16	●	**JETPAC** *Mastertronic*	1.99
17	●	**CREEPY CAVE** *Atlantis*	1.99
18	●	**MICROBALL** *Alternative*	1.99
19	●	**DOTTY** *Mastertronic*	1.99
20	▼16	**SUPERIOR COLLECTION VOL 1** *Superior*	9.95

Compiled by Gallup/Microscope

Star Wars shoots to number one, followed by Tynesoft's Winter Olympiad in second place. Three budget new entries make their debut at the bottom of the chart – you can read the Creepy Cave review in this issue of *The Micro User*. Alternative's budget collection, Triple Decker makes a reappearance at number 11.

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ARCHIMEDES

DATABASES

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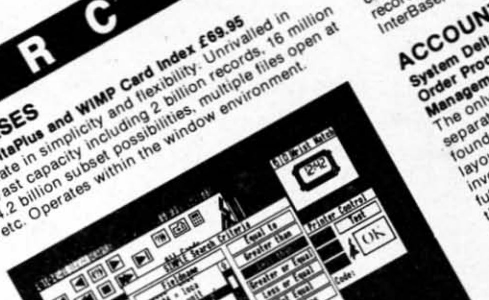

- Multi-tasking. Edit one file whilst searching another
- Instantly find records by number or field content
- Search by simple selection windows (as illustration) or multiple criteria complex searches
- Multiple user-definable formats for print or display
- Simple card creation with various data entry types
- Unrivalled, comprehensive maths, searches and sort
- Mailing labels with line compaction
- Comprehensive, yet simple reporter facility
- Card copier to transfer records across files
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- Includes relational programming language, if required

DeltaBase £29.95 *Affordable excellence*
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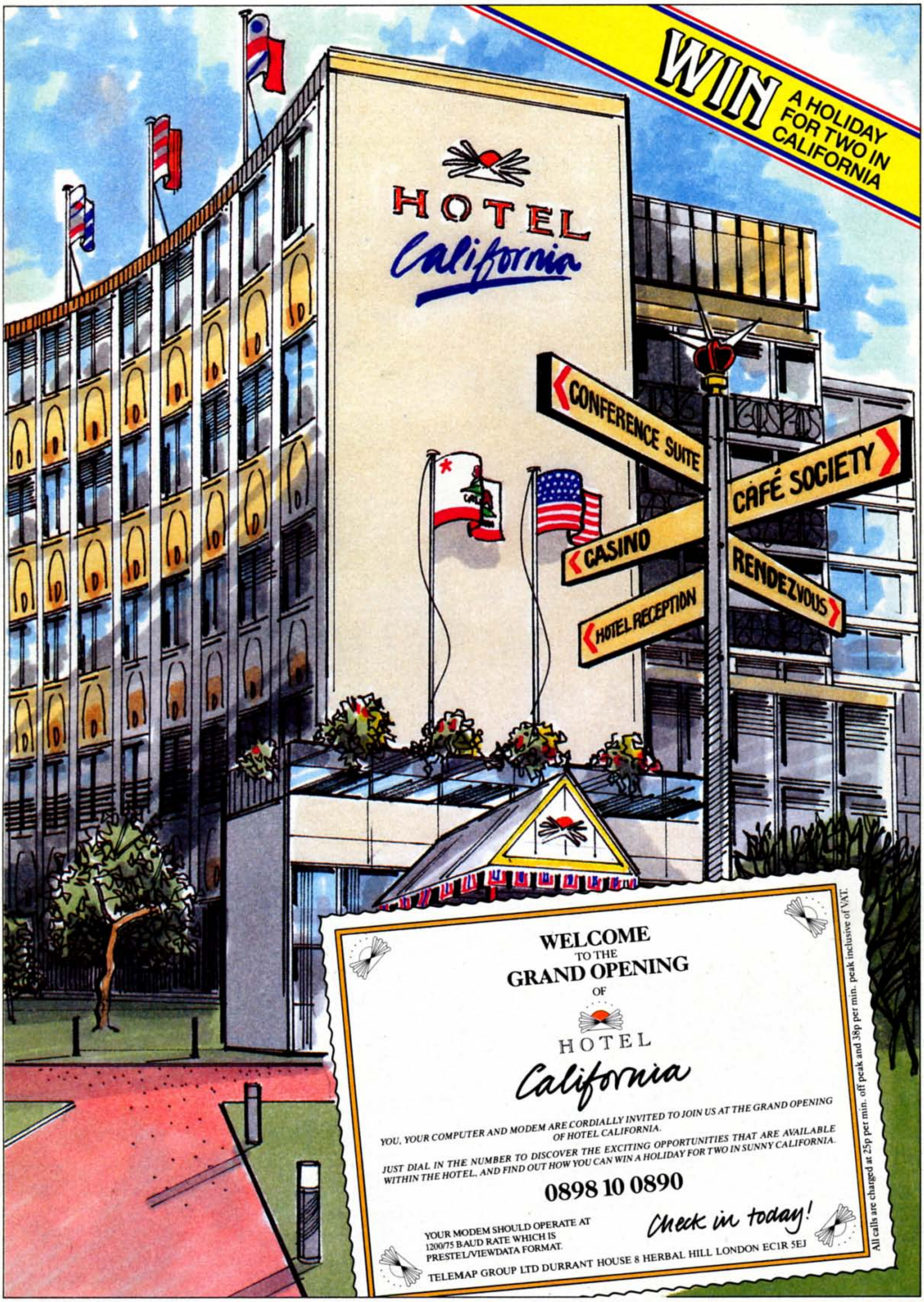
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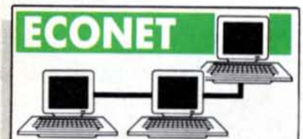

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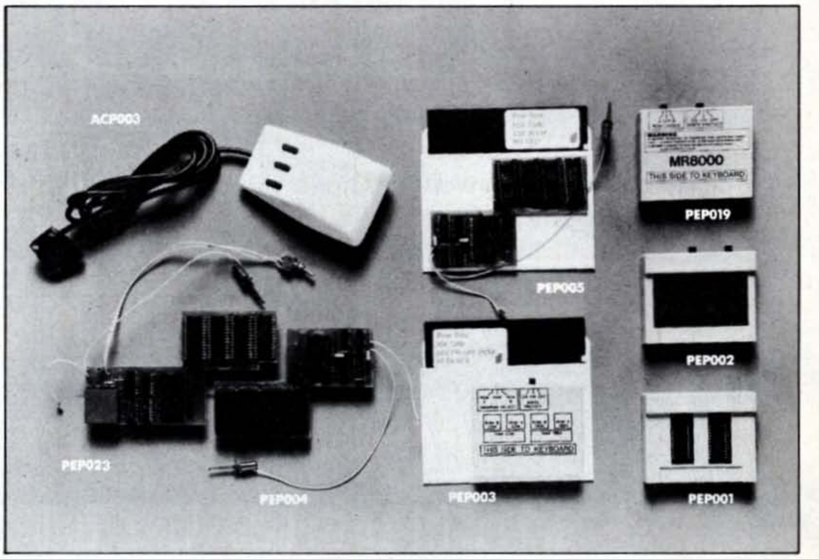

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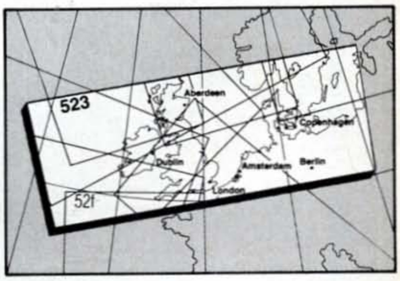

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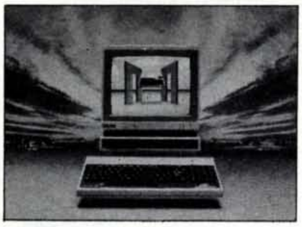

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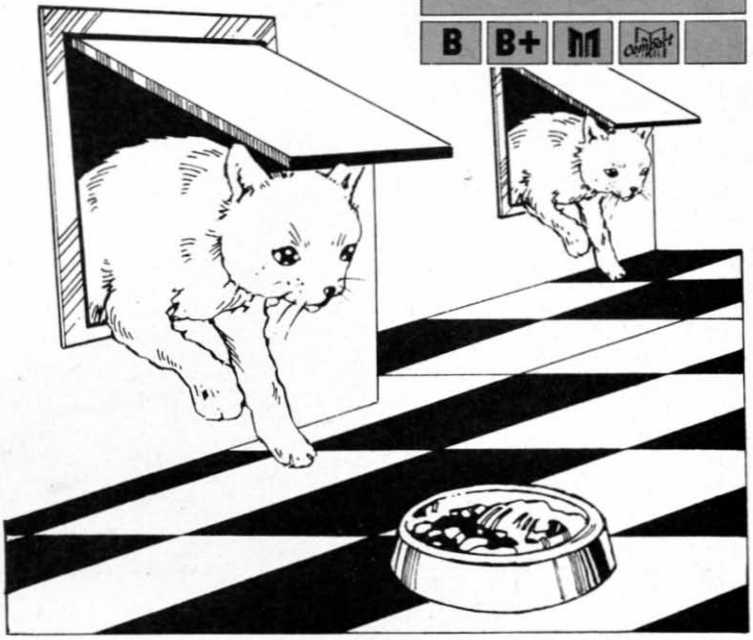
Andrew Lefevre has a neat device to monitor your pet's night on the tiles

Getting into a cat flap



THIS combination of software and hardware monitors the movement of cats in and out of the house day and night by using a very simple switch made from common household items. It should appeal especially to naturalists and cat lovers. It also demonstrates how to use your BBC Micro to record other simple real-world events such as counting customers entering a shop.

The switch is fitted to the cat flap and its usage is displayed in graphic form so you can see at a glance if the cat is in or out and at what time the last movement occurred. If you have more than one cat it is even possible to tell, after some experience, which cat entered or left the house by the contact time displayed.

While the switch is robust enough for cats, a different style of switch would be needed for dog flaps and in cases where a dog uses a cat flap.

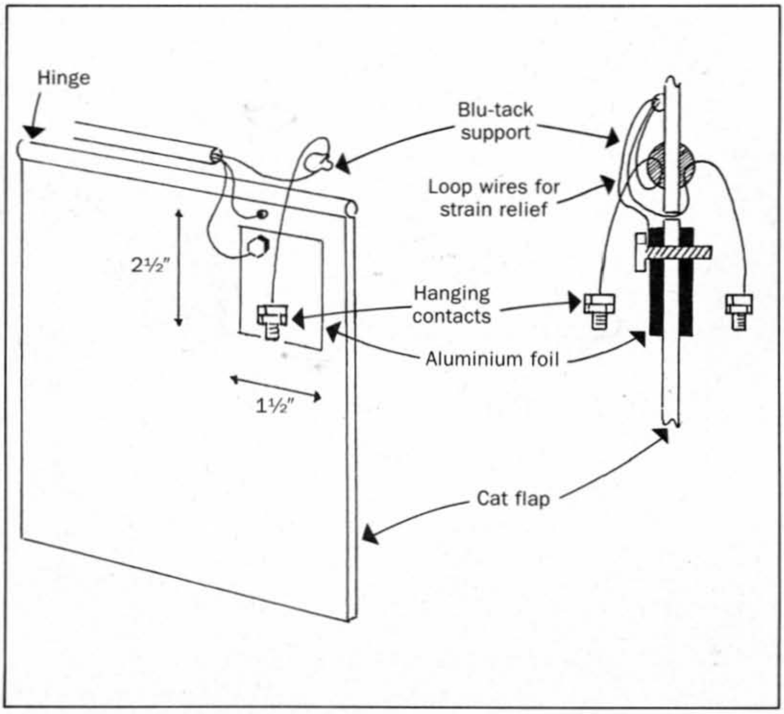


Figure I: Cat flap switch construction

CONSTRUCTION DETAILS

The switch is made from two aluminium foil strips and two hanging contacts. The strips are glued using contact adhesive on opposite sides of the cat flap in a position near the top of the hinged door, as in Figure I.

Two small holes are drilled as shown. The first should be big enough to allow a small metallic bolt to pass through. This is used to electrically connect the two strips of foil and forms the common central connection of a single-pole two-way switch.

The second hole is used to pass a wire to the external hanging contact which detects cats leaving the house. The wires leading to the hanging contacts should be thin, flexible and looped to minimise strain on the wire during operation of the cat flap.

The hanging contacts were made from small metallic nuts and bolts which are tightened to secure the stripped end of the flexible contact wire. The bolts should be heavy enough to pull the support wires out straight, and enough wire should be used so that the door opens approximately half way before contact is made between bolt and foil.

The flexible wires can either be soldered directly to the sensor extension cable or attached via a connector such as a DIN plug and socket depending on the site of the cat flap. If the flap is situated in a door you may wish to disconnect the sensor occasionally. The connections to the computer are shown in Figure II.

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◀ *From Page 25*

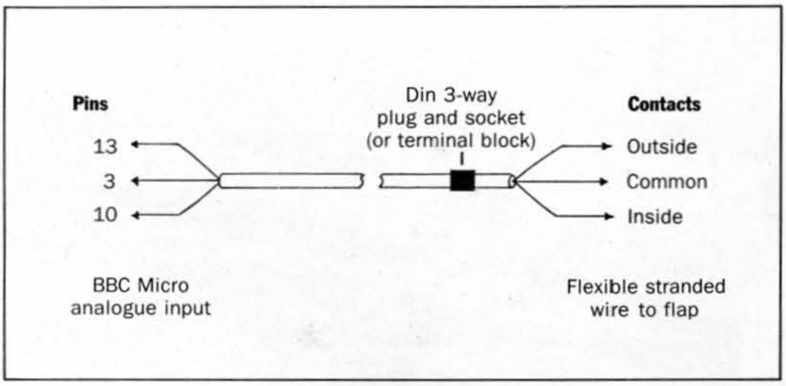
Pins
13
3
10
BBC Micro analogue input
Din 3-way plug and socket (or terminal block)
Contacts
Outside
Common
Inside
Flexible stranded wire to flap

Figure II: Switch connection to computer

HOW THE PROGRAM WORKS

When the cat flap first hits the contact there will be a bounce – typically 1-2 milliseconds. By allowing for this, the program is prevented from signalling the entry or exit of dozens of cats when only one has used the flap. Because most cat flaps swing back, the software must also compensate for the reverse contact, and a dead time – usually 0.75 seconds – is allowed after the cat has gone through the door.

The routine – PROCsense – times the entry/exit of the cat by waiting until the entry or exit contact has been activated and measuring the contact time – how long the cat actually takes to enter or exit. The procedure also detects contact bounce and keeps the contact time running if any bounce occurs.

The display is updated by PROClog which displays the cat's movements on the monitor. If you want a screen dump then add the line:

```
875 IF INKEY$0="D" PROCdump
```

and add your dump routine – which could be a call to a rom – to the end of the program.

RUNNING THE PROGRAM

Type in the listing, check it with Get it Right! and save it as Miaow.

Before connecting the sensor cable to the computer try running the program with a pair of joysticks attached to the analogue input socket. After entering the input data try squeezing first one fire button and then the other. If all is well the contact time should vary and the number of cats in the house will change.

Now connect the cat flap sensor cable. Try opening the flap outwards until the hanging contact brushes against the foil. Now let the flap swing back. The monitor should display a cat leaving the house.

If it displays a cat entering the inputs to your micro should be reversed. Some experimentation may be needed with the cat flap dead time and contact bounce time to suit your cat flap.

If you have more than one cat the contact time can be used to identify which one has used the flap – the program could easily be enhanced to track individual cats.

One word of warning: If after a night of micro cat flap watching the monitor displays more cats in the house than you actually own, either the scruffy neighbourhood tom has come in or your cat changed its mind halfway through the door.

```
10 REM CATFLAP
20 REM BY Andrew Lefevre
30 REM (c) Micro User
40 MODE4:PROCinit
50 CLS:PROCtitle
60 REPEAT
70 PROCsense
80 PROClog
90 UNTIL FALSE
100 END
110 DEF PROCinit
120 start=0:stop=0
130 s2$=STRING$(2," ")
140 s8$=STRING$(8," ")
150 flap=0:PROCinptime
160 PROCdata:PROCchars
170 ENDPROC
180 DEF PROCchars
190 REM Cat trotting left
200 VDU&F017;&C682;&FEFE;&FED6;&3F6C;
210 VDU&F117;&FC00;&CCFC;&0CCC;&FC0C;
220 VDU&F217;&3F3F;&7E7E;&E6E6;&0E0E;
230 VDU&F317;&FCFC;&7F7F;&3333;&7070;
240 clt$=CHR$240+CHR$241
250 clb$=CHR$242+CHR$243
260 REM Sitting cat
270 VDU&F417;&3120;&3F3F;&3F35;&0E1B;
280 VDU&F517;&8080;&8080;&8080;&0000;
290 VDU&F617;&3F1F;&3F3F;&3F3F;&7F7F;
300 VDU&F717;&8000;&8F8F;&8383;&FFFF;
310 cst$=CHR$244+CHR$245
320 csb$=CHR$246+CHR$247
330 REM Cat trotting right
340 VDU&F817;&6341;&7F7F;&7F6B;&FC36;
350 VDU&F917;&3F00;&333F;&3033;&3F30;
360 VDU&FA17;&FCFC;&7E3E;&6767;&7070;
370 VDU&FB17;&3F3F;&FEFE;&CCCC;&0E0E;
380 crt$=CHR$249+CHR$248
390 crb$=CHR$251+CHR$250
400 REM House
410 VDU&FC17;&E3E1;&0CE6;&3818;&D878;
420 VDU&FD17;&1898;&1818;&1818;&1818;
430 VDU&FE17;&CC80;&3C6C;&0C1C;&0F0E;
440 VDU&FF17;&0C0D;&0C0C;&0C0C;&0C0C;
450 hlt$=CHR$252:hlb$=CHR$253
460 hrt$=CHR$254:hrb$=CHR$255
470 cnt$=s2$+"Contact"+s2$
480 ENDPROC
490 DEF PROCtitle
500 PROCtime:PROChouscats
510 PRINTSPC10crt$s2$"Catflap"s2$clt$
520 PRINTSPC10crb$s2$"______"s2$clb$
530 PRINT'"Cats in house:"s2$nct$
540 PRINTSPC16ncb$':ENDPROC
550 DEF PROCtime
560 S%=(TIME DIV 100)MOD 60
570 M%=(TIME DIV 6000)MOD 60
580 H%=(TIME DIV 360000)MOD 24
590 time=(stop-start)*10
600 H$=FNstr(H%):M$=FNstr(M%)
610 S$=FNstr(S%):lft$="HH:MM:SS"+cnt$
620 con$=RIGHT$(s8$+STR$time,5)+"mS "
630 lfb$=H$+":"+M$+":"+S$+" "+con$
640 ENDPROC
650 DEF FNstr(N)=RIGHT$(s2$+STR$N,2)
660 DEF PROChouscats
670 NCC=NC:IF NC>7 NCC=7
680 nct$=STRING$(NCC,cst$)
690 ncb$=STRING$(NCC,csb$)
700 nct$=hlt$+nct$+hrt$
```

Turn to Page 28 ▶

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1770 DFS

1770 Disc Interface:
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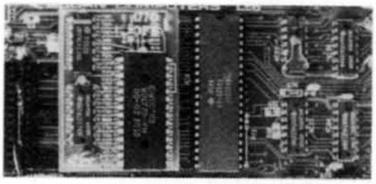

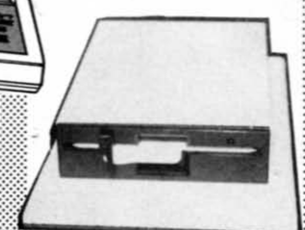

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DFS ROM

DFS ROMS:
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ADFS and DFS Version 2.1 ROM set (32k, 2 chips) for the 1770 chip:
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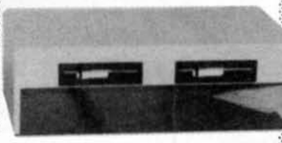

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SOLIDISK — WHERE TECHNOLOGY MATTERS

◄ From Page 26

```
710 ncb$=hlb$+ncb$+hrb$
720 ENDPROC
730 DEF PROCinptime
740 LOCAL H%,M%,S%
750 INPUT"Hours   ="H%
760 INPUT"Mins    ="M%
770 INPUT"Seconds="S%
780 TIME=((H%*60+M%)*60+S%)*100
790 ENDPROC
800 DEF PROCdata
810 PRINT"Number of cats (1-7)";
820 REPEAT NC=GET-48
830 UNTIL NC>0 AND NC<8
840 VDU NC+48:DT=0.75
850 CBT=2:ENDPROC
860 DEF PROCsense
870 REPEAT REPEAT X%=ADVAL(0) AND 3
880 UNTIL X%<>0:start=TIME:XR%=X%
890 REPEAT REPEAT X%=ADVAL(0) AND 3
900 UNTIL X%<>XR%:stop=TIME
910 FOR I%=1 TO 50:Y%=INKEY(CBT/10)
920 IF (ADVAL(0)AND3)=XR% I%=60
930 NEXT:UNTIL I%<>61
940 UNTIL (stop-start)>14
950 Y%=INKEY(DT*100):ENDPROC
960 DEF PROClog
970 flap=flap+1
980 IF XR%=1 IF NC>0 NC=NC-1
990 IF XR%=2 IF NC<8 NC=NC+1
1000 PROClformat:ENDPROC
1010 DEF PROClformat
1020 PROCtime:PROChouscats
1030 IF XR%=1 T$=lft$+clt$+s2$+nct$:B$=
lfb$+s2$+clb$+s2$+ncb$
1040 IF XR%=2 T$=lft$+crt$+s2$+nct$:B$=
lfb$+s2$+crb$+s2$+ncb$
1050 PRINT T$'B$':ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 159.

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```
  10 =    0 0   220 = 964A 2   430 = 7CB2 1   640 = ED0F E    850 = C1F1 A
  20 =    0 0   230 = 7EFC 5   440 = 2CFE B   650 = B6C6 5    860 = E32B D
  30 =    0 0   240 = 16A1 4   450 = DE7B B   660 = E3A5 0    870 = 23CF 7
  40 = 49E8 8   250 = 81CD E   460 = EF98 B   670 = E99C 1    880 = B5EB F
  50 = 18DC B   260 =    0 E   470 = E956 6   680 = E961 7    890 = 23CF 3
  60 = BFBA 5   270 = 89DC 8   480 = ED0F C   690 = 817D C    900 = 981F D
  70 = ED5C 7   280 = BE42 E   490 = 5C22 9   700 = C742 5    910 = 5510 4
  80 = 9B7A F   290 = FA70 C   500 = C587 8   710 = B8EA F    920 = 9BB6 9
  90 = 226C C   300 = 6E73 4   510 = F6C7 A   720 = ED0F 1    930 = 74B2 F
 100 = FD2E 3   310 = 8762 F   520 = C020 3   730 = 79B4 B    940 = 8325 B
 110 = 40D7 F   320 = 100E 5   530 = 6680 B   740 = 3A3B 2    950 = 32D5 9
 120 =  9F9 C   330 =    0 5   540 = 46F0 2   750 = D57C C    960 = 7939 A
 130 = 827D 2   340 = 28BC A   550 = 29B2 1   760 = F2BB D    970 = E8B1 3
 140 = 90BE 8   350 = 3BAC 7   560 = 6967 0   770 = 39FB A    980 = 9230 0
 150 = 41AE 2   360 = 9A3D 4   570 = F249 B   780 = 6D34 7    990 = 27AE 0
 160 = 59AA C   370 = CAD4 4   580 = 5AAF C   790 = ED0F 9   1000 = 460F A
 170 = ED0F B   380 = 5DEF 2   590 = E960 5   800 = 62DB D   1010 = D0D6 3
 180 = B300 3   390 = 669B 7   600 = 4D84 3   810 = F3DF D   1020 = C587 5
 190 =    0 3   400 =    0 7   610 = 690E 7   820 = 9263 C   1030 = BB15 B
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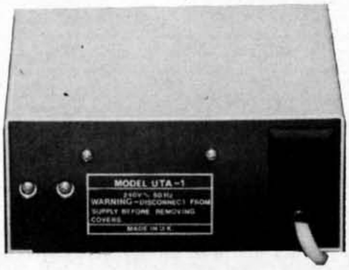

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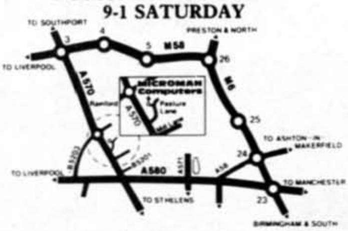

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KOURTYARD . . . large scale adventure

Price: £9.95 (cassette), £11.95 (disc), £14.95 (Master Compact available soon)
Supplier: Go-Dax, 12 Chiltern Enterprise Centre, Station Road, Theale, Berkshire RG7 4AA.
Tel: 0734 302600

KOURTYARD is an arcade-adventure with you centre stage as the noble King Arthur. All is not as it should be: Camelot has been ransacked and your crown jewels and your sword, the mighty Excalibur, stolen. Instead of doing the sensible thing and sending a powerful army to get them back, you decide to recover them by yourself.

The game starts in the forest surrounding the enemy castle. Armed only with a bow and arrows you must work your way through the forest, over the drawbridge and into the castle.

The once peaceful countryside is swarming with enemy soldiers, all itching to take a pot shot at you. Traversing the forest is reasonably easy – you simply duck behind the nearest tree and fire arrows at the passing baddies. But once you leave cover and head for the castle, things start to get more difficult.

Across the drawbridge you encounter a number of hazards which rapidly drain your precious energy. Initially I found it very difficult to determine exactly what was doing me so much damage before the words Game Over brought everything to an abrupt halt. I eventually worked out that walking too close to the moat counts as falling in, which reduces your energy by a hefty amount.

Pits and other traps – notably the collapsing trap doors that kill you instantly if you walk over them a second time – all add to the dangers.

Your supplies of both energy and arrows can be replenished by running over a cherry symbol or a quiver respectively. I found that I needed to replenish my energy far more often than my supply of arrows, but both are vital, and you certainly need to remember where you last saw the relevant replenishing point.

Kourtyard reminds me of Ravenskull: Each level is one huge maze, seen in plan view, which scrolls smoothly around you as you move. However, Kourtyard runs in the brightly-coloured Mode 2 rather than Ravenskull's comparatively drab Mode 5, so the grass is really green, the water really blue. The finely detailed graphics speak volumes for the amount of time spent on them.

Kourtyard is vast, so much so that each of the four levels – the area outside the enemy castle, the lower and upper floors of the castle and a "magic landscape" – is loaded separately.

The scrolling, good though it is, does have one rather serious design fault. In Ravenskull you are always in the centre of the screen, so you can see what's in store for you. In Kourtyard, however, the maze does not scroll until you reach the edge of the screen. So you do not know that you have walked into a pit – with its corresponding loss of 25 points – until it is too late.

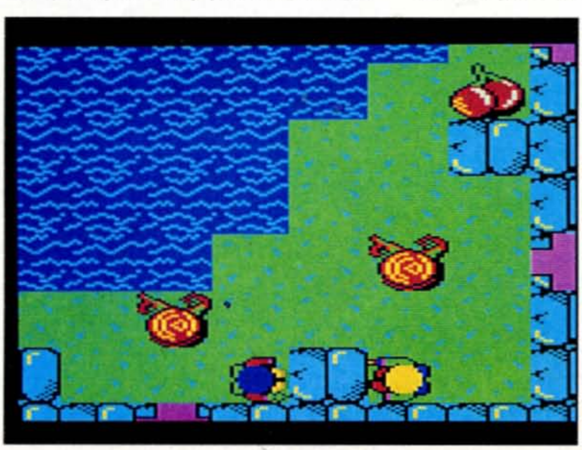
Kourtyard follows a number of other recently released-games – such as Repton 3 and Impact – in offering a screen designer, which allows you to construct your own mazes.

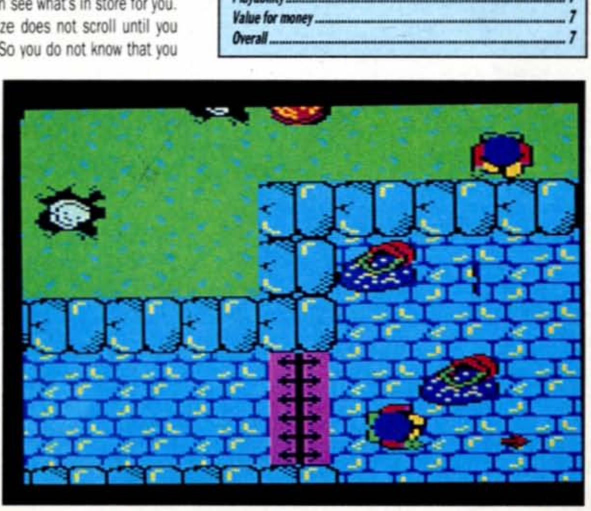
Although I found it worked well, the maze is displayed in exactly the same way as if you were actually playing the game, instead of being reduced to the Repton 3 style display. It is, therefore, essential to plan out a maze on paper before attempting it for real.

This game is an interesting challenge for arcade players with a strong leaning towards adventures, but not one that particularly appeals to me. Try it and see for yourself.

Hac-Man

Sound	***6***
Graphics	***8***
Playability	***7***
Value for money	***7***
Overall	***7***





THE BUG-BYTE COMPILATION II . . . hits and misses

Price: £7.95 (disc)
Supplier: Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.
Tel: 01-439 0666

COMPILATIONS seem to be popular nowadays and are being eagerly bought by gamers normally delighted with the excellent value they get. Sadly though, not all compilations are good value, and I have to class The Bug-Byte Compilation II in this category.

It is made up of four games, Cricket, Hunkidory, Jack Attac and Ice Hockey. Two are of fairly good quality but the others are, quite frankly, a waste of space.

The idea of **Cricket** is that you control your pub team in playing a one day match against The Merry Hackers touring side. There is also a two-player version where one of the players controls The Merry Hackers. You can decide whether the match will be of 10, 20 or 40 overs.

When your team is fielding you control the bowler, and, once he has delivered the ball you can manoeuvre him into a position to make a catch. If your side is batting you control the batsman and after hitting the ball you can decide whether or not he tries to go for a run. At the end of each over the fielding side can alter its field placings.

If a player is out, and at the end of each over, the up-dated scorecard is shown, but more often than not it is wrong. For instance, after seeing the ball being hit over the boundary rope for four runs, the scoreboard only indicated two.

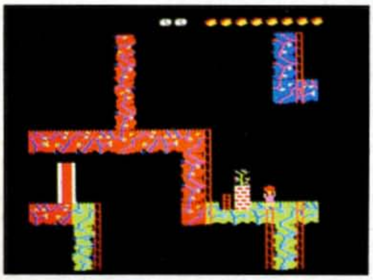
I found the game tedious and frustrating. Occasionally, the screen became cluttered with extra bowlers because after one made a catch, the sprite failed to be cleared from the screen.

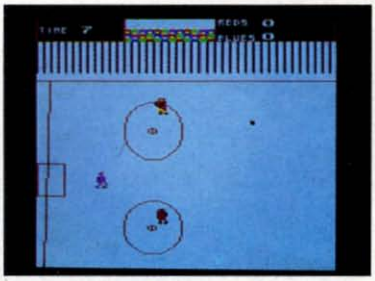
The game also neglects to tell you who has won, and even after your side has scored more runs than the opposing team – which in real cricket signals the end of the match – the opposing bowler just goes on running up and trying to bowl you out.

Despite the fact that this is not the worst game in the compilation, it only just fails to fall into that slot by virtue of the fact that I could turn the annoying tune off while playing.

Hunkidory is an early Peter Scott game which stars, yet again, a spherical droid by the name of Dave the Dungdroid. You control him in his bid to escape from the dungeon in which he has been imprisoned.

On your way out you must collect the valves liberally sprinkled about the 20 increasingly difficult screens. If you manage to collect all the valves on a screen a trapdoor opens through which you can escape to the next screen. Each contains monsters on the look out for a tasty Dungdroid to devour. You can kill them with your shield, but this costs a fair amount of your limited energy. Fortunately your supply is replenished between each screen. The screens also contain deadly spikes and mines and a few moving platforms on which you can hitch a lift.





My only criticism is that at the end of each game it takes too long to restart another. You have to hit a key and wait several seconds for the high score table to appear, hit it again and wait a few more seconds for the instructions page, then select whether you want sound or not, finally you hit the spacebar to start again. However, the game is simple, very addictive and so much fun to play that I can live with the delay.

It is a shame that Hunkidory should be released on a compilation. It deserves better stable-mates.

Jack Attac is an early graphic adventure game which combines Jack and the Beanstalk with Jack and Jill. Jack, under your control, has to search 45 screens of the beanstalk for the key to the cell which holds his sweetheart Jill.

Along the way are useful and not so useful objects plus several keys which allow you to open doors to other areas. The beanstalk is also inhabited by strange creatures which rob you of a life if you bump into them. They include snails, birds and flying Daleks. Even innocent-looking bushes are fatal.

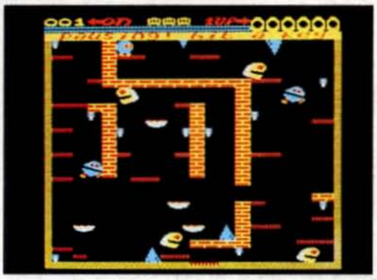
If you find the key to Jill's cell and pick it up you wake up the giant who lives at the top of the beanstalk. You then have a frantic two minutes to get back down to ground level, free Jill and escape.

The graphics aren't as clear and impressive as later games in this genre but that would be a bit too much to expect. All in all, this one is excellent despite its age and I enjoyed playing it. I'm determined to get past the awkward spot where the Daleks hover in wait for the poor, unsuspecting Jack.

I remember the first time I saw **Ice Hockey** back in the days when it was released on its own. I wasn't impressed with it then, and my opinion hasn't changed since.

It's a simple simulation where you control the Red team in their game against the Blues. The instructions give you quite a bit of information on the rules of ice hockey, but once I started playing I found this information totally superfluous.

The game appears to be nothing more than a slightly more complicated version of those early tennis games you used to be able to get hold of which comprised of two bats hitting a ball backwards and forwards on the screen. The winner was the player who managed to get the ball past his opponent's bat most often.



Ice Hockey is the same except that there are six players on each side – the same keys control all six and the playing area has been expanded to cover three screens.

The micro controls the Blue team and usually scores lots of goals and defends its own with consummate ease. The poor old human player in the meantime struggles to get more than half a dozen goals in the allotted time while despairingly trying to figure out how to keep the Blue team from scoring more than 20.

I gave up after just a few attempts. Of the four games in the compilation, this is the worst.

In conclusion I could forgive someone for producing a compilation with one slightly duff game, but when half of what you pay for would probably not even be accepted as magazine listings, I really do object. Come on Bug-Byte, we know you can do better than this.

Desmond

CRICKET	
Sound	*5*
Graphics	*7*
Playability	*5*
Value for money	*6*
Overall	*6*

HUNKIDORY	
Sound	*8*
Graphics	*9*
Playability	*9*
Value for money	*6*
Overall	*6*

JACK ATTAC	
Sound	*7*
Graphics	*7*
Playability	*8*
Value for money	*6*
Overall	*6*

ICE HOCKEY	
Sound	*3*
Graphics	*6*
Playability	*3*
Value For Money	*6*
Overall	*6*

CREEPY CAVE . . . when the spirit moves you

Price: £2.99
Supplier: Atlantis Software Limited, 28 Station Road, London SE25 5AG.
Tel: 01-771 8642

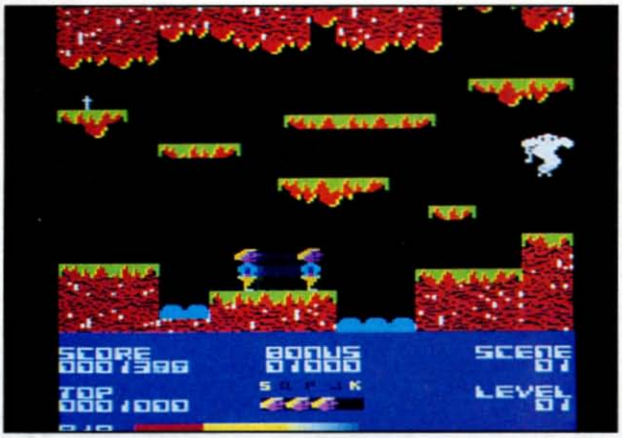
THIS is a budget-priced offering from Atlantis where you, as Dirk Daring, must recover your front door key from an evil ghost who nicked it from you. Quite what a ghost would want with your front door key, apart from settling in for a quick spot of haunting, isn't too clear – but the game is quite good fun anyway.

The first thing that greets you when you load Creepy Cave is precisely that – a foreboding picture of a very creepy-looking cave indeed. After the game starts, you must wait for the ghost to float across the first cavern where it begins to leer at you, dangling your door key like a carrot before a donkey.

Infuriated by this show of arrogance, you start out across the cavern floor – and promptly dive head first into a pool of acid. Back at the start of the cave, you try again. This time a great leap sails you across the acid to the far shore. Ahh! Now you know how to make that infernal ghost grin from the other side of its ectoplasm. Or do you ...?

With mounting satisfaction you hop from ledge to ledge and finally the opposite side of the cavern is within sight. With one mighty leap the ghost is before you. Except that you are now in the second cave, and that manic ghost again floats away to a safe position, still dangling your key enticingly.

Cave number two is much more interesting, with moving belts to contend with besides the ever-present acid pools.



After negotiating a relatively safe path and receiving only a couple more acid baths, again you reach the far end of the cave.

Now flaming red-hot chunks of stone are falling from the ceiling and plopping into the acid pools. You begin to wonder whether a quick trip to the key-cutting shop with your spare key might not have been in order after all ...

Creepy Cave is quite good family entertainment. There is no blood and guts – it's easy to play yet quite addictive, and you never know what surprises the next cave will hold. The story is perhaps a little off-the-cuff, but who cares? The days when games were sold on a storyline itself are long gone.

For a little less money Creepy Cave would be an excellent buy. As it is, with dozens of great budget titles appearing every year, Atlantis may have less of a demand for it than there would have been even as little as a year ago.

Chris Nixon

Sound	***5***
Graphics	***6***
Playability	***7***
Value for money	***5***
Overall	***6***

SCOOPS . . . adventure pot pourri

Price: £9.99
Supplier: Adventure Soft (UK), PO Box 786, Sutton Coldfield, West Midlands B75 7SL.
Tel: 021-352 0847

BY their very nature compilations tend to be gambles, and when I first saw this one from Adventure Soft (UK) including four Scott Adams text adventures, I was a bit sceptical. Why, on a four-adventure compilation, was there the need to include two of Scott's most mediocre offerings, Voodoo Castle and Pirate Adventure?

Voodoo Castle is a good mystical taster for absolute beginners but that is as far as I would recommend it.

Pirate Adventure has nothing, in my opinion, to recommend it. It is supposedly an escapade involving the discovery of fabulous treasure on a strange island. It is, in fact, nothing more than a collection of short brain teasers with only two treasures and 20 odd locations, doing little to tax the old grey stuff.

Strange Odyssey and the previously unreleased, **Buckaroo Banzai** whetted my appetite, but if the object of the exercise had been to release a cross-section of the best of Scott Adams, it might have been more judicious to include a classic such as Golden Voyage instead of the tiny Pirate Adventure.

Having now played all of Scott Adams' adventures when they were first released, I was anxious to experience Buckaroo Banzai. The sales hype states: "Only by unravelling the many puzzles set by Scott Adams do you stand any chance of completing this futuristic adventure, set in the world of pop groups and science fiction".

I wish I had been given the chance. My copy was riddled with garbled messages and annoying bugs and the little I was able to play did not convince me of its merits. It is not, as Adventure Soft acredit, an adventure of moderate difficulty but rather, totally confusing. I understand that unbugged copies are now in circulation – a little late for many, I am afraid.

Strange Odyssey is a superb science fiction jaunt which will involve much head scratching if you are to succeed in your quest on an alien planet. Its parser and text compression are rather limited by today's standards, but this adventure is more than four years old.

This is a Pandora's box of a compilation which would be a bargain investment for the beginner to text adventuring, but will hold little of substance for the more experienced traveller.

Pendragon

Presentation	***8***
Atmosphere	***5***
Frustration Factor	***4***
(Buckaroo Banzai 10)	
Value for Money	***8***
Overall	***6***

COMPUTER HITS VOLUME FOUR . . . all good stuff

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THIS is yet another bundle of the best – or supposedly best – games of yesteryear, the fourth in this particular series from compilation specialist Beau-Jolly. No less than eight of the 12 games featured have already appeared on compilations – four of them on Beau-Jolly's own Five Star Games II.

Zalaga was one of the first games to offer a simple diet of pure mindless destruction. Hordes of aliens stream on to the screen and settle menacingly above you. Without warning they scream down towards you as you move your laser base to intercept.

Things are very hectic as the Zalagans have a nasty habit of curving off the bottom of the screen then coming up and ramming you from below.

Galaforce takes the basic idea of a straightforward shoot-'em-up several stages further. It features a number of different types of brightly-coloured alien and a much greater variety of attack formations, as well as a great musical accompaniment. Unlike Zalaga, it gives you up and down controls as well as the conventional left, right and fire. Now you can go out and get 'em, rather than waiting to be overwhelmed.

Gary Partis' **Psycastria** must have appeared on almost every compilation since its original release. It is a super-smooth sideways-scrolling game covering four different scenarios – land, sea, the moon and deep space.

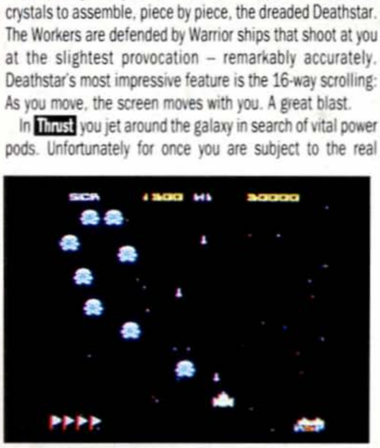
Although the idea is to shoot the 10 energy pods on each level, you quickly learn to survive by simply shooting everything in sight.

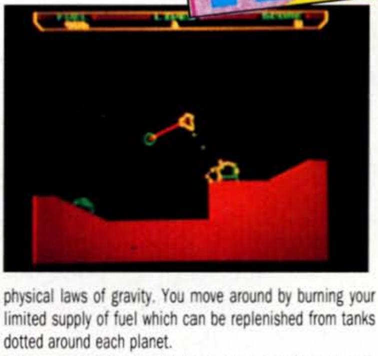
Each of the four attack phases must be cleared in one go – if you lose a life you must start that level again. This feature – my only gripe with Psycastria – can get infuriating after a while, but the game is well worth a little perseverance.

Deathstar is an excellent conversion of the arcade game Sinistar, in which you are the pilot of a solitary mining spaceship in search of crystals. Shoot the asteroids to release them – once collected they act as bombs.

Competing with you are the Worker ships, which use the crystals to assemble, piece by piece, the dreaded Deathstar. The Workers are defended by Warrior ships that shoot at you at the slightest provocation – remarkably accurately. Deathstar's most impressive feature is the 16-way scrolling: As you move, the screen moves with you. A great blast.

In **Thrust** you jet around the galaxy in search of vital power pods. Unfortunately for once you are subject to the real physical laws of gravity. You move around by burning your limited supply of fuel which can be replenished from tanks dotted around each planet.





The many hostile gun emplacements are problem enough – but your troubles really start when you manage to capture a pod, because then your ship's handling changes dramatically. To finish a level you must destroy the planet's reactor before blasting off with your prize into the void. Great, but very tricky.

Bug Eyes II is an arcade adventure in which you, Agent Starman, must collect the 25 keys dotted around and about in order to release your predecessor, Agent Zelda, from prison. Jet-packed lizards, scissors, snakes and worms all bounce around merrily intent on robbing you of your precious oxygen supply. The superb music and special effects are let down by a rather weak game.

Needing no introduction is **Repton**. In this, his first adventure, you must collect diamonds while avoiding falling boulders and Repton-eating reptiles. Some of the diamonds are hidden in safes, and needless to say the key is never easy to find. Playing number one again rather leaves me looking for the transporters, skulls and fungus – but it's as addictive as ever.

In **The Mine** you tunnel in search of buried treasure, hampered by the mine's many other inhabitants who are all out to stop you. You can easily dispose of them with your neutraliser, but time is always against you. The Mine is a fairly average implementation of Dig Dug, quite fun, but not for very long.

Blagger is a Manic Miner-style platforms and ladders game in which you run and jump around 20 increasingly difficult levels. As burgler Roger the Dodger you must collect all the keys and rob the safe before progressing to the next level. Although Blagger is fun, it is quite slow and jerky and compares unfavourably with more recent offerings.

Ghouls is another Miner-type platform game. This time you are in a haunted house and must watch out for spiders, poisoned spikes and collapsing floors. Although it was very popular in its day, it never grabbed me. It still doesn't.

Killer Gorilla is an implementation of the arcade machine game Donkey Kong, in which you chase the gorilla up increasing difficult sections of scaffolding in an attempt to rescue the fair maiden from its clutches. The movement is jerky and the sound rather basic, but it's a game I still go back to on occasions. I think you will too.

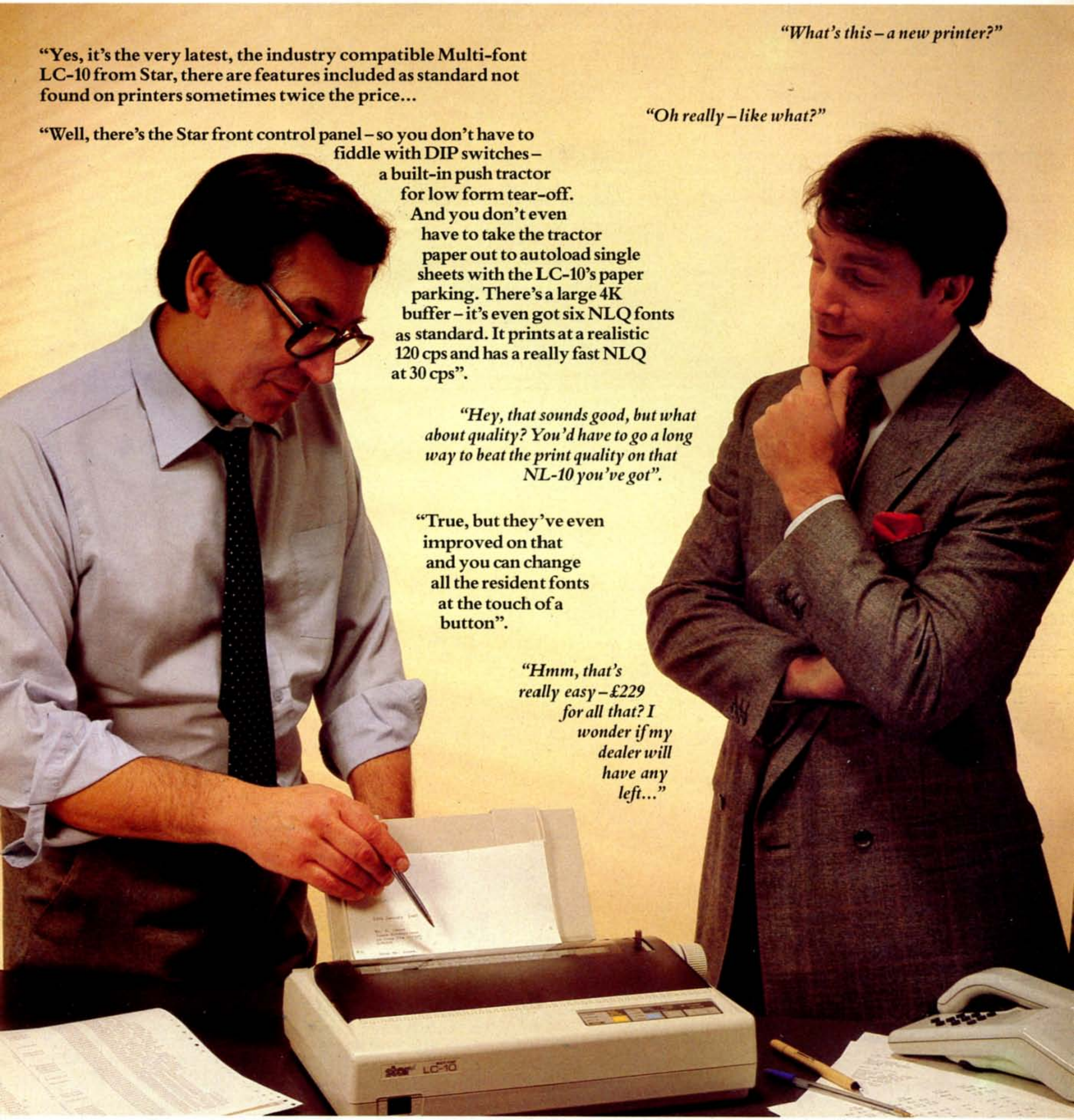
Released as a competitor to Yie-Ar Kung Fu and Way of the Exploding Fist **Karate Combat** is a martial arts game. Although you can play against the computer or a human opponent, the practice mode is very useful, because there are some 17 manoeuvres to be mastered: Thank Buddha for joysticks.

The graphics are finely detailed, but somewhat on the small side. Although Karate Combat was well received first time around, it lacks the technical merits of its competitors.

Hac-Man

Sound	8
Graphics	8
Playability	9
Value for money	9
Overall	9

"£229 for all that?"



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"Oh really – like what?"

"Well, there's the Star front control panel – so you don't have to fiddle with DIP switches – a built-in push tractor for low form tear-off. And you don't even have to take the tractor paper out to autoload single sheets with the LC-10's paper parking. There's a large 4K buffer – it's even got six NLQ fonts as standard. It prints at a realistic 120 cps and has a really fast NLQ at 30 cps".

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LC MU4

TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!

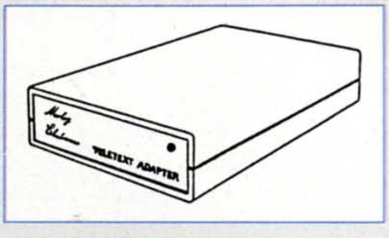
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.

The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.

With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

- Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
- Simply plugs into the user port.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
- Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
- FREE Telesoftware, no access charges (updated weekly).
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
- Gives you a real-time clock at your disposal (*TIME).
- Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
- Easy to follow comprehensive user guides.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



WHAT THE REVIEWERS SAID:

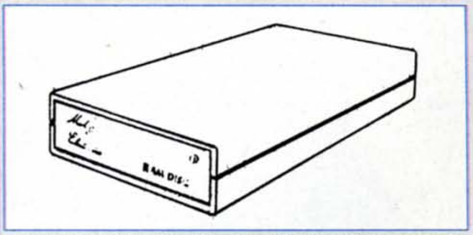
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*

". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*

". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*

THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

RAMDISC



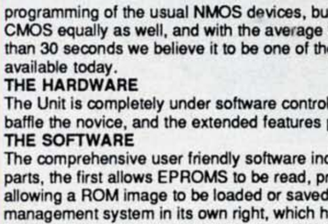
Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:

One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.

Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.

This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.

Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications. These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.

These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.

QUADS–also available quad cartridges, specifications as Duels but 4x16k ROM's.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.

The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.

The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'

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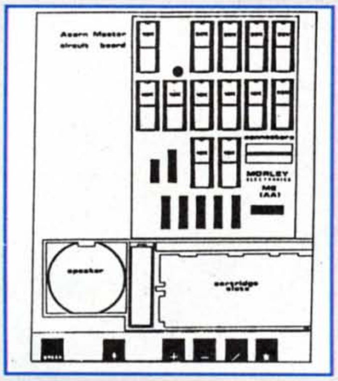
Telephone: Tyneside (091) 2627507

Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges



A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/ MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

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Qty. _____	Teletext Utilities on disc	5.98	(c)
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Qty. _____	2 Megabyte RAMisc	349.60	(a)
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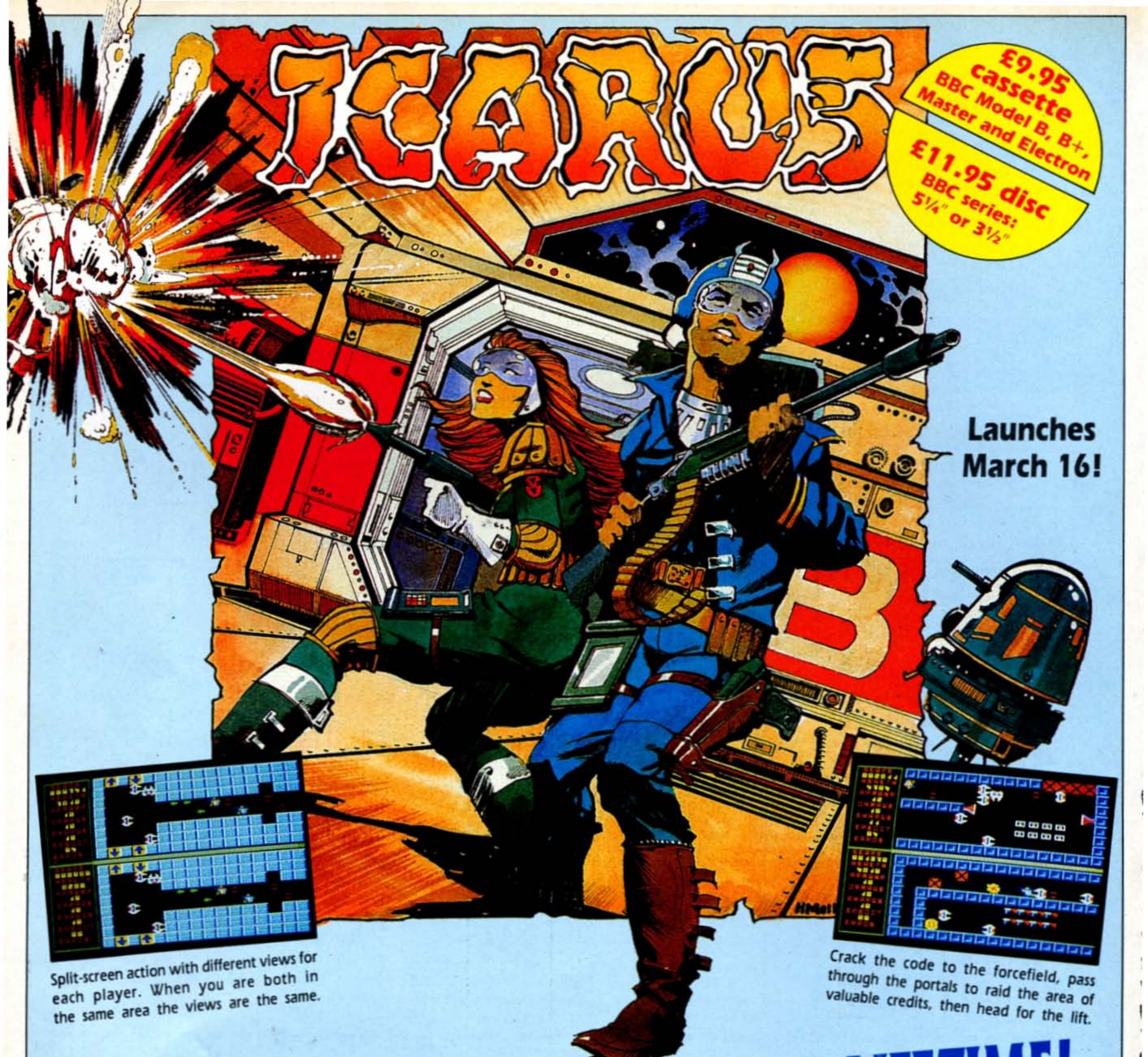

Split-screen action with different views for each player. When you are both in the same area the views are the same.

Crack the code to the forcefield, pass through the portals to raid the area of valuable credits, then head for the lift.

Now *TWO* can play – and experience . . .

THE CHALLENGE OF A LIFETIME!

Starship Icarus is plummeting towards the sun, and the only hope of averting the impending cataclysm is for you to teleport on board, disable the master computer and regain control . . .

This spectacular fast-action game has a unique split-screen which means that one player can complete the game on his own – or play simultaneously with a friend – to fight the trigger-happy droids which infest the ship. With 20 levels of nerve-racking excitement, forcefields, mines, electronic doors, emergency lifts, movable walls, and opportunities to build up your armour, blaster and health ratings, this is one game you won't complete in a few weeks!

There can be no doubt that Icarus, with its incredible one- or two-player action, is one of the most exciting games ever created for the BBC Micro and Electron.

Check it out for yourself – and take up the challenge!

Icarus is the result of six months' intensive work by Powerhouse Software, the programming team which developed the top-selling Dunjunz. A full three months has been spent play-testing and fine-tuning to produce an addictive challenge with a gameplay that's really out of this world!

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Matter of identity

I RECENTLY bought a second-hand BBC Micro, model number 01-ANB01-3054903. Could you please tell me which model it is – A or B – and what year was it made?

While my family and I are happy with it as a home computer, is there any advantage in upgrading it and if so what would you recommend?

Also, could you please suggest a disc drive and printer to match my micro? – **Peter A. Draper, Killamarsh, Sheffield.**

● *There is no simple way to tell from the serial number if you have a model A or B but there are very few of the former about these days. Look on the underside of your computer: If there is a row of sockets for disc drive, tube and so on then you have a model B. Also, when you switch on, the start up messsage should show 32k – a model A had 16k.*

When you buy a second-hand micro it is always worth taking the lid off to make sure there are no botched alterations. Remember, if it's had no modifications or upgrades, in my opinion it's worth more than one stuffed full of boards and wires.

Weather forecast

MAPLIN Electronics is selling a weather satellite receiver and decoder to run with the BBC B. Would it work and, if so, how good a picture would it produce?

It costs around £150. Is it value for money, or do you think it's an expensive gimmick? – **Jeremy Bull, Beasworthy, Devon.**

● *The BBC Micro is not particularly well suited to this type of display, but I have had a look at the Maplin design and it should produce perfectly acceptable pictures. In fact the ones it is capable of producing are of a better quality than the BBC Micro can display.*

Making the correction

HOW pleased I was to find someone with the same problem as me – Anthony Thomas in the January issue of *The Micro User*. I have recorded all the progress of my grandchildren from birth on video to give to them on their 18th birthdays.

I want to construct graphic screens from my BBC Master via the composite video socket on to the VHS recorder in colour and I am unsure of what you mean by *making link S39*. Would it be possible to be more specific for the non-electronic readers?

By the way, thank you for Fun School, a most invaluable aid in educating the grandchildren. – **Norman Jackson, Whitley Bay, Tyne & Wear.**

● *A link is an electrical connection and on the BBC Micro it is often made by using a jumper socket. This is usually blue and can be seen in various parts of the board, but on some BBC Micros the place for link S32 is not fitted with plugs so you need to solder a linking wire in.*

However, this advice only applies to the BBC B or B+: The Master has no provision for providing the composite colour output you require.

Unfortunately there is no non-technical solution to this except buying a very expensive PAL encoder. Looking at the circuit diagram you could try soldering a capacitor – say 100pF – between the base of Q3 – BC309 – and the emitter of Q12 – BC239. This could work, but I realise that you are not technically capable of carrying it out yourself. Perhaps a local dealer could do it for you.

We're pleased to hear that you like Fun School. Have you tried Nursery Rhymes – another suite of educational programs from Database Software?

Two into one . . .

I HAVE a BBC B and among other peripherals I have a lightpen and a joystick. Unfortunately both plug into the analogue port. So I have to keep on unplugging the cables, and the way that my micro is set up, this is quite awkward.

Is there any device – similar to Watford Electronics' User Port Splitter – for the analogue port so I can plug both in and switch between the two? There seem to be splitters for most ports except the analogue. – **D. Thompson, Cranage, Nr. Holmes Chapel, Cheshire.**

● *The lightpen input and joystick inputs are on different pins, so, in theory, it should be possible to make a splitter. However, most lightpens also use some of the facilities of the joystick input to tell the pen software that it is pointing at the screen – usually in the form of a switch.*

As there is no common standard for lightpens, any port splitter would have to switch all six inputs to the joystick port – two digital and four analogue – and this would be quite costly and reduce the potential market for such a device.

However, you could take the back off your lightpen connector and see if it uses pins 4, 7, 10, 12, 13 or 15. If it does, and most likely it only uses one, this would have to be switched. All the other lines could be wired in parallel to both joystick and lightpen as required.

Corrupted files

I HAVE written a complex dedicated database using disc-based random access files. These are occasionally corrupted by the odd sector being restored in the wrong place, duplicating some records and erasing others. Records are half a sector each.

The corruption is rare and sporadic but seems to increase with the frequency of disc access – which can get pretty hectic. It appears to have started when I got a Master, but I couldn't swear to this.

The database is used both on the Master and a BBC Micro series 7 with 80 track disc drives. The Master supplies the power for its drive and all saving to disc uses the PTR function with memory from &900 to &AFF and &70 to &8F used by assorted machine code subroutines.

The programs are well tested by now and all the fatal errors have been eliminated. As the corruption does not show up until later it is hard to tie the cause to any of the hardware or software.

What might be causing it? I assume no Basic error could be responsible. Are pages 9 to C not as free in the Master as in the BBC Micro, or could the disc drive timings be at fault?– **M.J. Carter, South Brent, S. Devon.**

● *First of all you are not helping the matter by using the computer's power to supply the drives – my strong recommendation is to always use separately powered ones.*

Having said that, the symptoms you have do not point to a hardware problem – there is no fault that I know of that will put a sector in the wrong place. For this to happen the disc controller must be sent the wrong information of where to put the sector, or the verification sequence must be wrong. So I strongly suspect that you have a software problem.

To see if the area you are using is being corrupted try dumping it to disc periodically to see if it contains what you think it should.

The error causing this problem is most likely to be one of your understanding of how your program works. You are probably making a wrong assumption somewhere and these problems with algorithms are always the most difficult to track down because they lie in your own assumptions. Try to get to a situ-

Turn to Page 40 ►

◀ **From Page 39**

ation where an error consistently happens: You could do this by working on a copy of your database file and tracking down the operations needed to make it misbehave.

Then explain to someone line by line why this should not happen. This person need not know anything about computing – I frequently use my wife for this. I find that in the middle of this explanation the penny usually drops.

Fire two!

I AM constructing an interface to connect two joysticks into the analogue port. I have basically completed the unit and have full control of horizontal and vertical operations on both, but only the fire button of the first one works with the interface.

I've wired it with reference to the BBC B instruction manual and asked around locally but have not yet found out where to make the connection for the second fire buttton. Can you please help me resolve this problem? – **V. Iwanczuk, Coventry.**

● *The second joystick fire button is located on pin 10 of the analogue input port. To make it work you should connect it through a switch to one of the zero volt lines such as pin 3. To read it use:*

```
A%=ADVAL(0) AND 2
```

This will give a value of 2 if the connection is not made and 0 if it is.

Weather wise

I AM going to build wind speed and direction indicators for a project at school and both will be read by a BBC B through its analogue-in port.

Can you please tell me what sort of rotary potentiometer will be suitable for the direction indicator? It will have to move freely and rotate idefinitely and will be read from channel one of the ADC.

I have read your magazine for nearly two years and find it extremely useful and interesting. – **J. Pinn (age 14), Exeter, Devon.**

● *I am glad to see you are designing your own project rather than simply copying mine. I have covered these topics in the past – a wind speed indicator was published in the June 1985 issue and a wind direction indicator in October 1986. However, both used the user port and not the analogue input port.*

While I can see a wind direction system working that way I don't think you have fully thought out the wind speed – I doubt whether this will work at all.

Nevertheless what you want is a fully rotatable pot. These are used in servo-feedback systems and are usually known as servo pots but, unfortunately, they are precision devices and expensive – about £17. They can be obtained from suppliers such as Radio Spares or Farnell, and your school may have an account with one of them. The Farnell phone number is 0532 63631 and the order number for a 10K servo pot is 157-10K.

Master drives

Would it be possible to connect 3.5in and the 5.25in drives to the Master? Also, is there a gadget called a disc drive port splitter? – **Pierre Karadia, Hanworth, Middx.**

● *Yes, it is possible to connect both types of drive to your Master. You do not*

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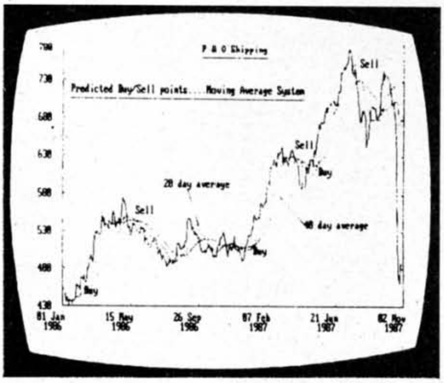

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

need a port splitter: Simply chain them on to one cable and change the drive select switch inside one of them – you may need to get your dealer to make up a special lead.

Some suppliers are now providing the two sizes of drive in one box for connection to the BBC or Archimedes computers so have a look at the advertisements in The Micro User.

Back to black

I USE my BBC B with a Ferguson 14inch colour television. If I leave the computer on with the TV off for more than 30 minutes, when I switch it back on, the picture is in black and white. The only way to get the colour back is to adjust the tuning on the TV slightly. Please can you tell me what is wrong and how I can cure it? – **R.H.J. Stocks, Lytham St.Annes, Lancs.**

● *It sounds like you are cursed with intelligent equipment. Many TV sets have an automatic frequency control switch which will automatically make fine adjustments to the tuning.*

But the modulator in the BBC Micro is not very stable and it will drift causing your TV set to re-tune itself, so when you switch back on it is outside the automatic re-tuning range and you have to do it manually.

You might find an AFC switch on the set's control panel, in which case you could disable this intelligent activity. Or it could be that the lock-in range of the phase lock loop colour subcarrier oscillator is below standard – in which case you need to have your TV repaired.

Upgrading queries

I HAVE a Mannesmann Tally 80 printer and a Microvitec 1451 which I use wth my BBC B. Will I be able to use them with an Archimedes? – **C. Roberts, Erith, Kent.**

● *Your printer will be directly usable but you will have to get another lead, as the Archimedes connector is not the same as the BBC Micro's. The same applies to the monitor, but in addition you will have to change the links inside it to make it an analogue one. The February 1988 Problem Solved described how to do this.*

Time stopped

I BOUGHT my Master 128 in February 1986 and ever since I have had trouble with the TIME$ function. After a while, sometimes a few days, often a month, it gives mistakes either one figure wrong or complete garbage.

I have returned my micro to my dealer twice, but he cannot find anything wrong. I don't think it has anything to do with the battery as the rest of the configuration does not change.

When the time goes wrong if I try to correct it with TIME$=" " I get an error message and the only way to put it right is to use the Panel, which always reads Jan 1 1986 after a mistake. – **H. McDonald, Bexhill-on-Sea, East Sussex.**

● *All this points to the clock chip itself so why not get your dealer to change IC11 – the 146818? Alternatively you can check to see whether C11 is fitted the wrong way round – its +ve side should connect to pin 24 of IC11 – as this would cause the symptoms.*

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VISA

by
The Mad Hatter
10/6

Alien invader brings a bonus

THIS being the issue that celebrates the month of – to use Chaucer's spelling – Aprille shoures, I am feeling generous and forthcoming. I will offer a small prize to the first reader to tell me who my bankers are. A few clues follow:

They were founded some two decades before that parvenu establishment in Threadneedle Street patronised by the Church Commissioners – Samuel Pepys and John Evelyn were among the bank's earlier customers. They have but two branches, one in the City of London and one in the West End.

Please tell me the name of the bank, when and where it was first established, and under what sign.

Modest historical research should provide the answer. This is not an April spoof but a genuine, if slightly recondite, puzzle.

On a general note, if you write to me but don't enclose a stamped addressed envelope, I'll still deal with your letter eventually, but strictly in the order of its arrival at the office once I have replied to letters with SAEs.

If the answer to your query is in an issue of the magazine already at the printers, has been published at about the time you wrote or appeared within the last few months – since you often have similar problems – I won't repeat it.

I'm on a very tight space budget, and could fill 10 pages an issue. The motto is: Read *The Micro User* regularly and don't forget the back number service.

Once again I have the use of my own BBC B rather than a borrowed Master, and this has enabled me to look at Incentive's Double Gold release **The Alien from Outer Space** back to back with **Dragon's Tooth**.

The cassette costs £7.95 and is available from Incentive, 2 Minerva House, Calleva Park, Aldermaston, Berks RG7 4QW or from retail software outlets.

Long ago, when I was young and the world was green – or maybe vice-versa – I read a story by the late John W. Campbell Jnr called, as I remember, The Thing.

It featured life, and messy death, at an Antarctic research station invaded by an alien entity which took over various characters until it was finally defeated.

The Alien from Outer Space is based on that scenario. In this graphic adventure your task is to identify and dispatch the threatening alien and thus save the world.

I can promise you this: I doubt if you'll solve it overnight, and I guarantee you'll be entertained.

Because the game was only released recently I've had a romp around, rather than serious sessions aimed at solving the entire adventure. The graphics are nicely drawn, the puzzles cleverly put together and the game is worth buying.

A caveat: The parser requires precision when you need to take anything. Thus, if you stumble across a cooker and open it, you may find a leg (of chicken).

```
TAKE LEG
```

Will produce a negative response – you must enter:

```
TAKE LEG FROM COOKER
```

This applies to everything in any kind of container.

The Alien from Outer Space is a cleverly designed teaser that will keep

Helpline

Twin Kingdom Valley tips for James Salter: Belting the dragon with the wooden staff works wonders, as does taking the giant for a swim.

Michael Calais tells me that the guard's uniform in that game must be worn to enter the Desert King's Castle via the drawbridge – so now we all know.

Anthony Graham provides help for Todd Newman in **Dennis through the Drinking Glass**: If he really wants to get out of the French model's clutches he should RUN.

He also solves Todd's problem in **Fantastic Four**: The torch must ignite the gas jets in the tunnel under the castle – the statue will then knock Xandu out so that he can rescue Alicia.

Advice from Anthony for Kay Chappell in **Labyrinths of la Coshe** is as follows: You need 379 points to enter Hades, completing the game in less than 136 moves allows you to become Grotto Master and score 400 points. As she lacks five points, she probably needs either the stamp, emerald, fleece or ruby.

Finally, Anthony offers help for several readers at different points in **Old Father Time**:

In the room with no exits, enter OMEGA. To become worthy to go N you must leave all objects except the staff in the chest. In the marble room, turn off the lamp and LOOK: This provides a clue for use in the Waiting Room.

Several readers have sent information about the mathemagical adventure **L**. It is obtainable from The Association of Teachers of Mathematics, 7 Shaftesbury Street, Derby DE3 8YB.

No price was given, but a member of the group who wrote it says the cost is very reasonable.

Peter Wareing has solved Tony Marter's problem in **Countdown to Doom**: From the Computer Room go down to the Square Room with the marked exits. There you go through them in the same order as you fed discs into the computer and you'll finish up in a Round Chamber. To stop the floating platform, move from the engine room to the control room and back until the platform stops.

K.R.Finn tells me that if Kay Chappel will give the troll the boulder that is found in the grounds of **Haunted Abbey** then she'll get the spectacles. The troll is a rock fan. I've just got a cassette of this game so I shall delve deeper.

Hall of Fame

Darren Higgs for a solution to **Old Father Time:** I can now help other readers if they write in with their problems.

adventurers happily occupied for some time. As a bonus, the tape has another adventure on the reverse side.

Dragon's Tooth is more traditional, albeit with occasional graphics reminiscent of Twin Kingdom Valley. On my machine the text descriptions went all peculiar every time the graphics appeared, but I could still decipher them.

If you think of Dragon's Tooth as a bonus, the cassette is excellent value, and the second game is well worth playing in its own right.

My recent comments on **Philosopher's Quest** brought a number of letters – not least from the game's author, Peter Killworth and the software house Topologika who have just reissued improved and extended versions of a number of classics.

The new version of Philosopher's Quest has added puzzles, so many of my solutions to its problems will need amending, says Peter. Disc versions for the BBC B and Master are available from Topologika, PO Box 39, Stilton, Peterborough PE7 3RL at £9.95.

Also available at the same price from Topologika are disc versions of **Countdown to Doom**, **Kingdom of Hamil** and – wait for it – **Acheton**.

Return to Doom is the sequel to Countdown and should be available later in the year. Watch for news of it in this column.

Incidentally, I have egg all over my face so far as one aspect of Philosopher's Quest is concerned: A reader pointed out that the Little Old Lady actually tells you her doggie's name is Spot.

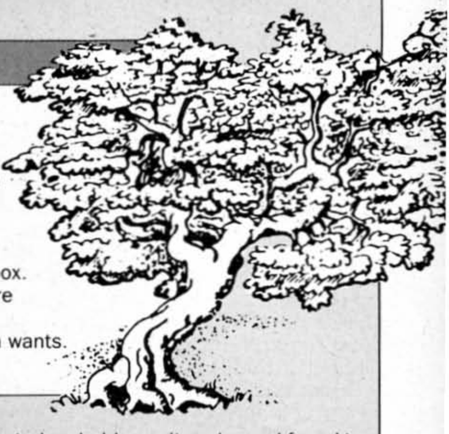
I've got to break a promise this month: There's not room for the review of **American Suds** – look out for it in the May issue.

● *See you next month. Until then, happy adventuring.*

Return to Eden Solution Part two

The answers to give to Graunch are:

Test	Answer	Hint
A	Love	is the blind god.
B	Rumour	is the secret's thief.
C	Time	is the great healer.
D	Life	is the most valuable possession.
E	Fire	is the dangerous playmate.
F	Computer	is the genie in the box.
G	Man	gets weaker the more feet it goes on.
H	Nothing	is what the rich man wants.
I	Trees	have cold blood.



If you have the roots, you can go into the twisted roots room for the cutters. Careful mapping is needed in this area. Pull the plug on Big Robot, go back for the credit card, which will then be stolen, and throw the flask of water at the bodyguard so that you can finally get the credit card back from the Godfather.

If you have the cutters you can leave via the grating, otherwise you will have to show the busker your credit card.

Only gamble six times at the casino, then you are certain to win – you need the money. Search and listen everywhere in the Theme Park for adverts and remember the numbers on them. Dig while wearing nothing at the many coloured sands.

In the little house on the prairie – I just love Laura Ingalls Wilder – answer YES in spite of your natural inclinations, then insert the credit card into the bevomat and drop the koala near the statue.

It is essential to complete the Theme Park area at one go, and then save the position. If you don't, the numbers to visit will change, and the ones you have noted probably won't work – as I found to my cost.

Rip up the washing powder for a free train ticket. Get out of the train at the first stop, go to the lift, then push the button to open the door. When in the lift, enter the number from the adverts and put a zero before one digit numbers.

Certain locations must be visited – and in a particular order if you are to get the best benefit from the shopping area. Other locations should be avoided like the plague, else you will finish up battered, broke or both. To get back to the station use the code 000.

After becoming a homeowner, getting a travel pass and screwfinger, go back to the station.

You must then visit the City Hall area – the train won't stop here – by pulling the emergency cord of the train in the next station it stops at, and going back down the line. You need a lot of patience to wait for a train – 20 or more WAITs.

When you have elected yourself Mayor, go N, W, N, and E through the Corridors of Power to the Seat of Power. Wear the visor, look at a number on the screen and then blink to get orders executed. I declared peace rather than war, and never bothered to find out what response there was to aggression.

After City Hall, it's time to go to the Spaceport, find the space bus and get the radcom which is essential for finishing the game. When you arrive in the Habiviron, kick the mushmat to get a plate, go into the shower and drop the plate. Then undo the grill with the screwfinger.

Evade the robots and find the cupboard where there is a daring spacesuit waiting for you. Then go into the airlock and through to the docking bay, enter the starbike and go to Snowball. Take the radcom to the control centre and you score 1000 points, are confirmed in office as Mayor and receive a fancy adventurer's title.

Problem Corner

Anthony Graham has some queries on Micropower's **Adventure**: He's found all seven treasures and thinks he's visited every room but...

How can he turn the frog into the princess without her running away? What's the point of the dragon, since he can get past it without killing it? The game vocabulary indicates the presence of a giant, some bread and a sword – where are they?

How can he score 423 points, since he can only carry six objects – is there a room for dumping the treasures? What use or significance are the dream, scarf, cage, slipper and oil?

Kristoffer Gavin would also like help with **Adventure**, so if a reader could send me a solution, I'd be grateful.

Ten-year-old Rowan Hackett is tackling a man-sized adventure in **Quondam**. He's at a place where I can't help him: How can he get the platinum medal to grow, where is the corkscrew, and finally, how can he pass the knight more than once?

I'd love to see a full solution to this fascinating and complex adventure.

Information on line

Steve Gold investigates some of MicroLink's useful gateway services

IT'S been a long time coming, but the information age is now most definitely upon us. However, like most things new, the information services available via a computer plus modem combination have been expensive, often requiring subscriptions to several services at a cost of a few hundred pounds.

Subscribers to MicroLink, however, have access to a variety of gateway services through which they can sift through the electronic information databanks on a pay-as-you-go basis.

Several gateways are available via MicroLink, ranging in price from a modest few pence to £3 a minute for their use. This may sound a lot for a simple service but – in the business environment at least – such charges pale into insignificance.

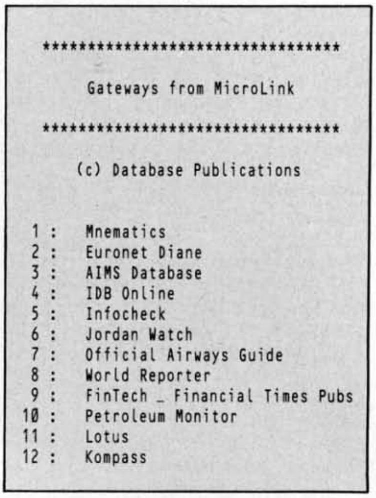
To put matters in perspective, let's first look at the alternative of searching for facts on line. MicroLink's gateway charges are a lot less than some bureau services charge for similar facilities, and still cheaper than committing several hours of your valuable time to searching through a library. Add to that the inconvenience of having to wait until the library opens, and it's not difficult to see why more and more people and businesses are turning to MicroLink's gateway services for their daily information needs.

Many MicroLink subscribers use the system directly or indirectly for their business. We can't all be John Paul Getty lookalikes, but it's surprising how a smidgen of information – often obtained for a few pence in online charges – can work minor miracles in the office.

Consider this: Your boss is putting the finishing touches to a deal with a relatively unknown company at the other end of the country. The deal is worth several thousand pounds in potential profit to your company. But what if something goes wrong?

It's a sad fact of business life that several thousand companies go under each year, usually for financial reasons. Bankruptcies and liquidations are becoming all too common, but what can the typical executive do to protect himself, his company and, perhaps, his job?

As you can see from Figure I, the gateways available on MicroLink cover a very wide field – from the Aims information service ranging through to the Official Airways Guide, the topics are diverse and – as we see in a moment – available in great depth.



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**********************************

     Gateways from MicroLink

**********************************

    (c) Database Publications


 1 :   Mnematics
 2 :   Euronet Diane
 3 :   AIMS Database
 4 :   IDB Online
 5 :   Infocheck
 6 :   Jordan Watch
 7 :   Official Airways Guide
 8 :   World Reporter
 9 :   FinTech _ Financial Times Pubs
10 :   Petroleum Monitor
11 :   Lotus
12 :   Kompass
```

Figure I: List of gateway services available via MicroLink

The basic charges for MicroLink are a £5 registration fee, a pay-as-you-go charge of 3.5p per minute off-peak, and 11p per minute during peak times – 7am to 7pm, Monday to Friday.

Gateway charges are extra, as is access to MicroLink on a local call basis from outside London. Non-London access costs up to 3p a minute extra, while the gateway charges vary depending on the database accessed.

You can see the charges for accessing MicroLink and its gateway services aren't too wallet-stretching, and the panels show a selection of the services available.

Although the details shown only

INFOCHECK

The Infocheck gateway is a comprehensive business information service which allows users to access basic information on every limited company in the UK – over a million.

A useful additional feature is the ability to access detailed company reports – along with a brief thumbnail sketch and credit rating – of more than 150,000 top companies.

Credit information is usually augmented with details of the company's growth record over the past few years and, if appropriate, name changes, liquidations and so on.

Infocheck also provides printed reports which can be ordered off line. Charges for this service vary depending on the amount of work required: Usually in the region of £6 to £15 per report.

The Infocheck service costs £3 a minute to access. It is one of the most expensive services available via gateway.

FT PROFILE SERVICE

Formerly known as the Datasolve World Reporter service, the Profile information database allows access to a massive, full-text database of national and international news, current affairs and business information.

Facilities include a comprehensive selection of the world's leading news services, newspapers and periodicals. The service allows full-text retrieval of several newspapers, including most of the quality dailies, as well several weekly and monthly publications. Since the service was sold by Datasolve to the Financial Times group in the summer of 1987, it has undergone a number of changes.

The current spread of databases available via the now-renamed Profile service is continuing to expand steadily.

The FT group says that the amount of information available by this spring will be nearly twice that for the same period in 1987. At the time of writing, charges remain static at £1.37 a minute for use of the gateway service.

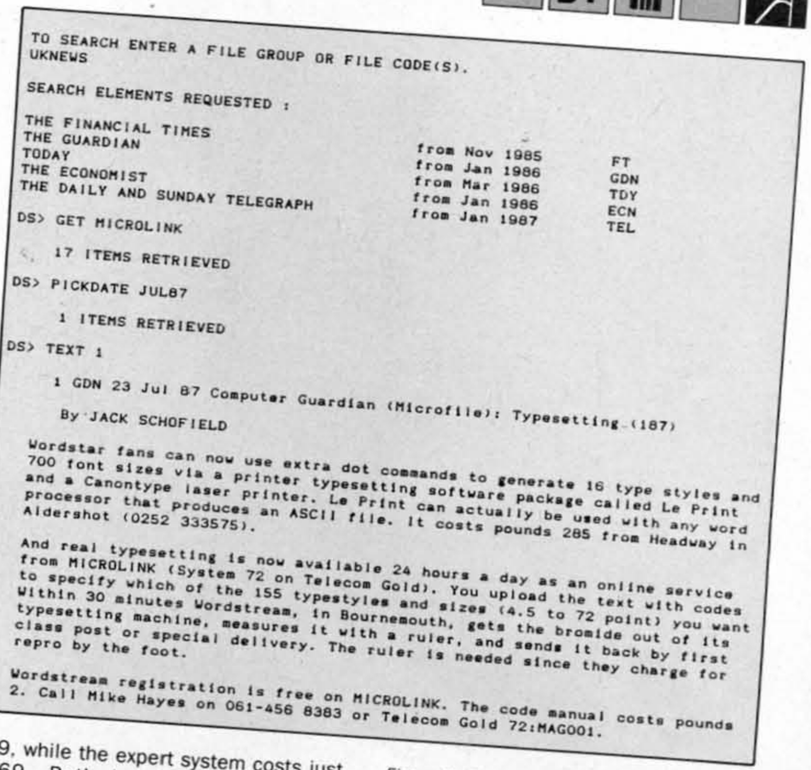
AIMS NEWS

The Aims News database is a daily bulletin providing in-depth news on many aspects of government assistance in today's business environment. Topics covered include information on UK and EEC grants, as well as avenues open to new and existing businesses when it comes to hard cash requirements.

Government and EEC grants are big business, with UK firms taking some £5 billion annually from European taxpayers. The bulletins are updated daily and are a convenient and easy-to-use digest of news on grants.

Aims News is compiled by the Centre for the Study of Public Policy at the University of Strathclyde.

The charge for accessing Aims News is £1.67 a minute.



```
TO SEARCH ENTER A FILE GROUP OR FILE CODE(S).
UKNEWS

SEARCH ELEMENTS REQUESTED :

THE FINANCIAL TIMES                         from Nov 1985      FT
THE GUARDIAN                                from Jan 1986      GDN
TODAY                                       from Mar 1986      TDY
THE ECONOMIST                               from Jan 1986      ECN
THE DAILY AND SUNDAY TELEGRAPH              from Jan 1987      TEL
DS> GET MICROLINK

     17 ITEMS RETRIEVED

DS> PICKDATE JUL87

     1 ITEMS RETRIEVED

DS> TEXT 1

     1 GDN 23 Jul 87 Computer Guardian (Microfile): Typesetting (187)

     By JACK SCHOFIELD

Wordstar fans can now use extra dot commands to generate 16 type styles and
700 font sizes via a printer typesetting software package called Le Print
and a Canontype laser printer. Le Print can actually be used with any word
processor that produces an ASCII file. It costs pounds 285 from Headway in
Aldershot (0252 333575).

And real typesetting is now available 24 hours a day as an online service
from MICROLINK (System 72 on Telecom Gold). You upload the text with codes
to specify which of the 155 typestyles and sizes (4.5 to 72 point) you want
Within 30 minutes Wordstream, in Bournemouth, gets the bromide out of its
typesetting machine, measures it with a ruler, and sends it back by first
class post or special delivery. The ruler is needed since they charge for
repro by the foot.

Wordstream registration is free on MICROLINK. The code manual costs pounds
2. Call Mike Hayes on 061-456 8383 or Telecom Gold 72:MAG001.
```

Figure II: Searching the Profile World Reporter on MicroLink

scratch the surface of the variety of gateway services available on MicroLink you should understand how useful they can be, whether you are a high-powered business tycoon making several hundred pounds a minute, or a clerk in busy general office.

To access MicroLink, you'll need your BBC Micro, along with suitable word processing and communications software – Mini Office II is ideal – and a modem to logon with. These vary in price, but generally start at around £20. The better quality modems usually cost in the region of £100 or more.

MicroLink is currently offering two modem packages for intending MicroLink subscribers: The budget one costs £99, while the expert system costs just £169. Both bundles include free communications and word processing software, modem, serial cable and free registration to MicroLink. As a special offer, MicroLink is also offering the first month of usage free of charge, so what have you got to lose?

Contact: MicroLink, Europa House, Adlington Park, Adlington, Macclesfield Cheshire, SK10 4NP. Tel: 0625 878888.

JORDANS

The Jordans online database holds information on more than 1.7 million registered companies in the UK today.

As well as the million plus companies listed on the Infocheck service, Jordanwatch also includes small partnerships not necessarily listed as a limited company.

Information on the Jordans database is drawn from the records kept by the Companies Registration Office in London together with records of several other government departments.

Corporate and financial information is maintained on a growing number of companies which are split into three separate groups: Major companies with either turnover greater than a million pounds, pre-tax profits greater than £50,000, or shareholders funds greater than a million pounds.

Some other firms which fall below the above financial criteria have full financial details online either as a result of customer demand or by virtue of their inclusion in a Jordan survey.

New companies are included in the database but, as a special service, Jordans selects a group which it judges as being trading companies rather than shelf, or readymade, and puts up extra details in order to provide important new business leads.

The Jordans database costs £3 a minute to access via MicroLink.

KOMPASS ONLINE

Kompass is one of the most recent additions to the gateway list and allows interactive searches of several business directories, including the Kompass and Kellys directories, the Directory of Directors, the British Exports and UK Trade News directories.

The database currently covers more than 225,000 companies, with that figure growing on a weekly basis. Although the information is not as diverse or comprehensive as that available on Infocheck or the Jordans service, it is cheaper, with charges starting at 60 pence a minute during off-peak times.

A separate file is available containing the registered name and address of all 1.3 million companies registered at Companies House. Selection can be made on current or previous names. Companies that have ceased trading in the last two years can also be retrieved

Perhaps reflective of the reduced level of charges, the Kompass gateway is only available between 9am and 10pm on a Monday to Friday basis.

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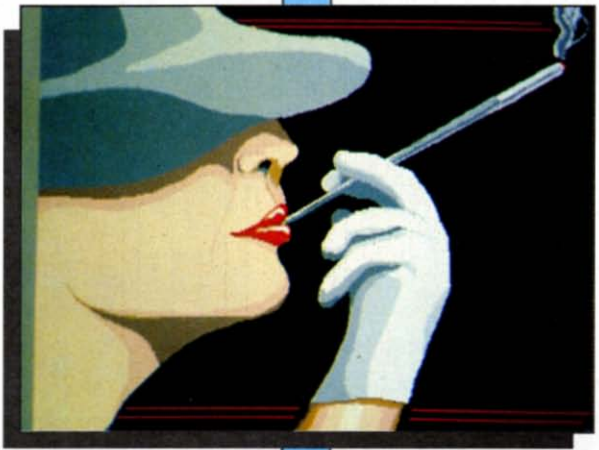
GALLERY

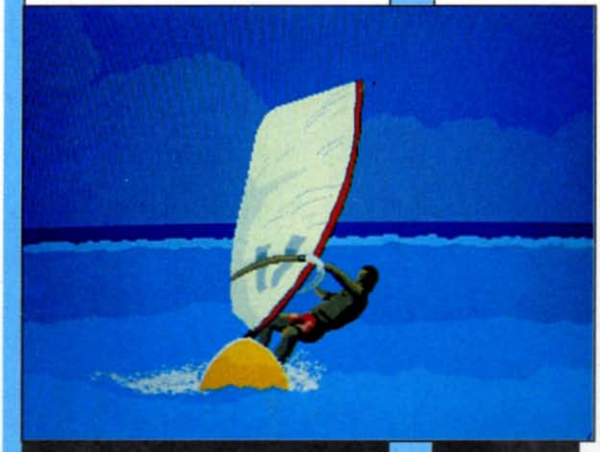
MUCH has been made of the graphics capabilities of the Archimedes, and now you can judge for yourself. All the pictures on this page were produced by the prolific Craig Wareham and Dave Lear using Artisan from Clares Micro Supplies.

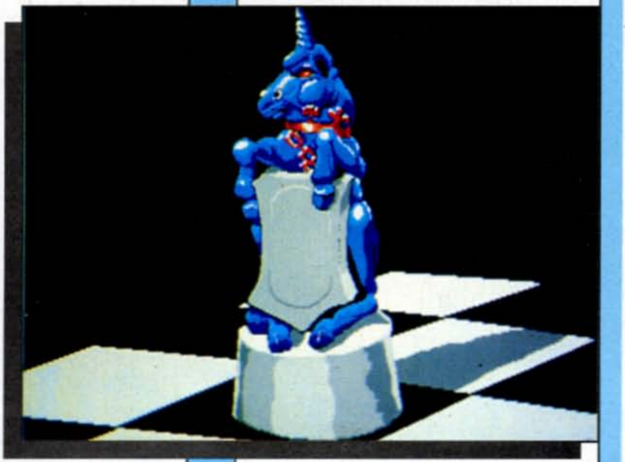
Apart from being superb computer artists in their own right the two contributed to the development of the Artisan program. Although only using the 16 colour Mode 12, equivalent to Mode 0 in resolution, these pictures demonstrate the power of the machine.

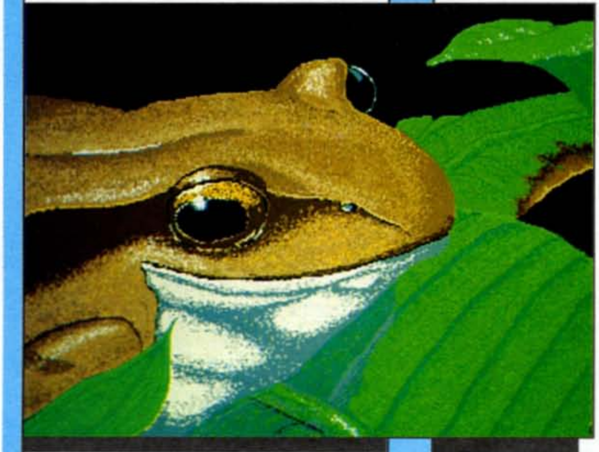
When contributing to *The Micro User* Gallery please ensure that you state which art package was used to create the screen and enclose an SAE for return of your media.

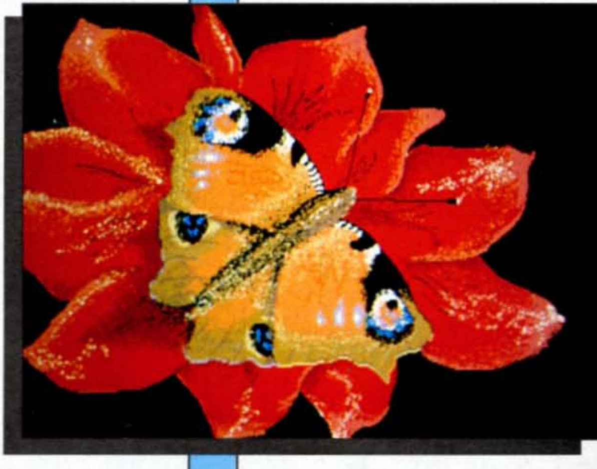
The address to send your masterpieces is Gallery, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.











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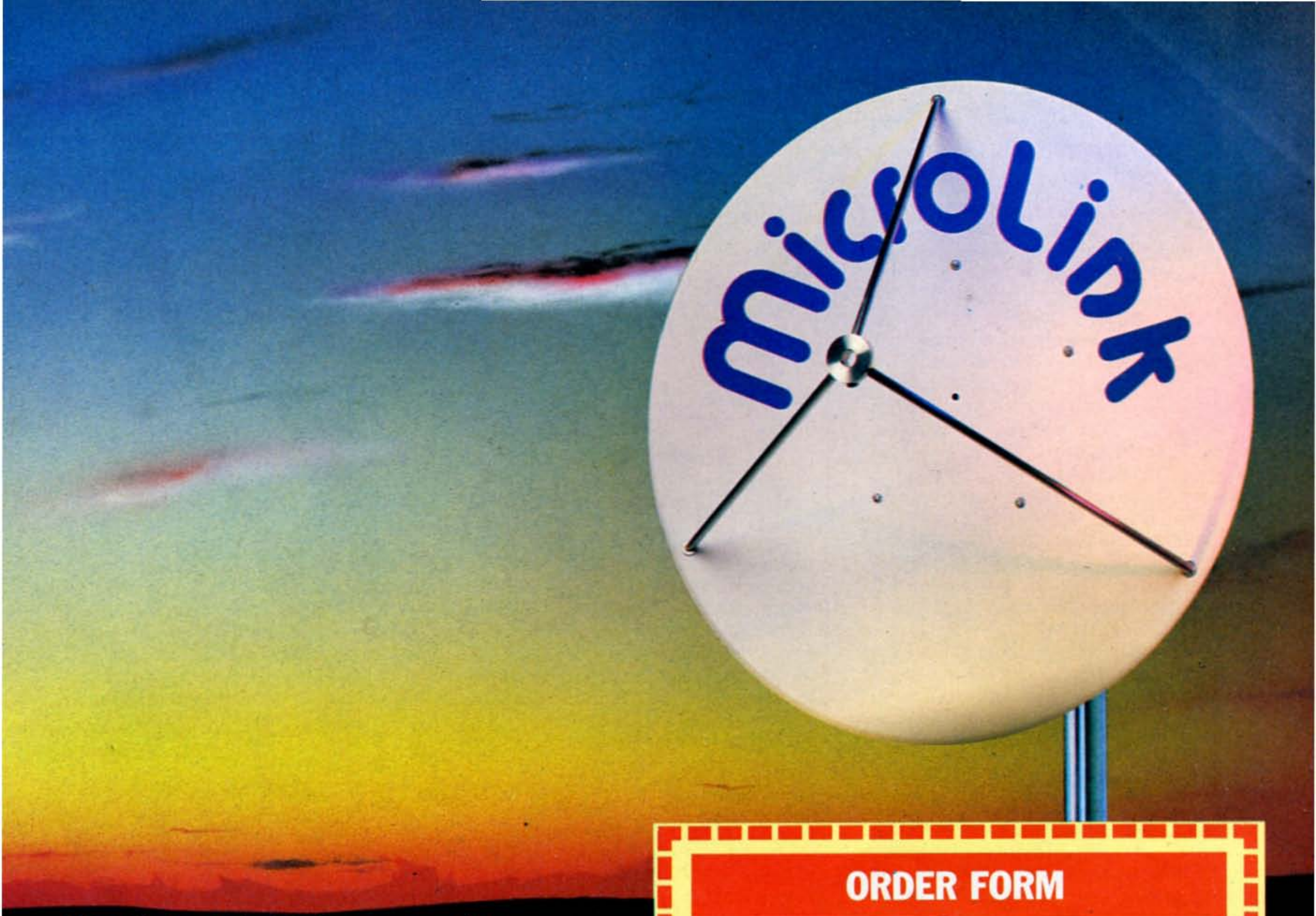

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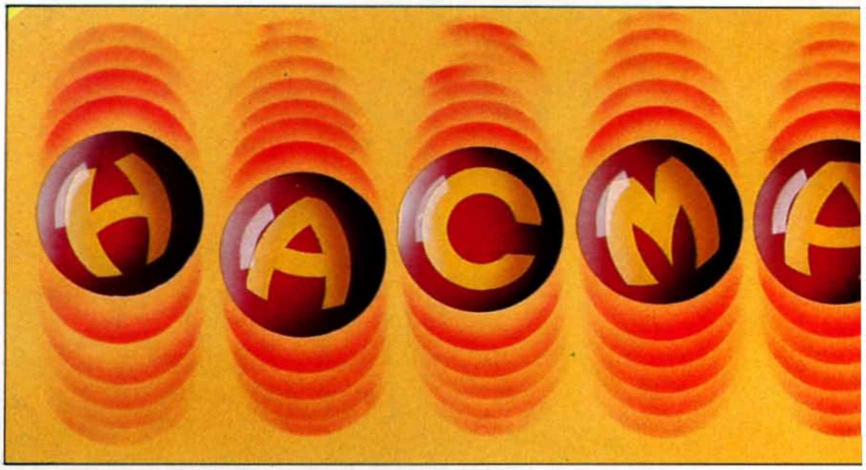
A309

Discover the inner secrets of arcade games with...



HERE is a full solution to Superior's superb arcade-adventure **Codename:Droid – Stryker's Run Part 2**. Thanks to Nik Lacey, Siddhurth Patel and Gavin Shek for the method, and also to Thomas Veitch, one of the major contributors to last year's Stryker's Run solution.

First a number of general points: Shoot on sight all Volgans that stand in your way – if you don't they'll shoot you. Don't, however, attack any Volgans that are not going to be in your way. There's no point in looking for trouble – you'll run into enough as it is.

And remember that if you kill a guard, move to another level and then return. The guard will be back in place. This is especially important when a Volgan is guarding a lift.

Pick up everything you find, especially the security pass cards. There are a great number of them and not one is spare. Try to conserve your laser energy by using the six mines carefully. The jet-pack uses fuel even if you are stationary, so keep on the move.

Take particular care with the metal blocks and cranes hanging from the ceiling at intervals throughout the complex. Always crawl under them and keep crawling until you are clear, or they will fall and crush you.

Consult the maps – hidden in the microfilm cassette – regularly. They allow you to check the positions of the guards and to plan your overall route.

Now on to the game. On Sector One of the Surface Defence get the pass card then descend to Sector Two. Fight your way across, collecting the energy cell, microfilm and security pass card. Beware of the metal block.

Take the lift down to Sector Three, turn around immediately and shoot the Volgan guard. Take the crate, which will give you two energy cells and six security pass cards. Go back to the lift, go up two levels to the left-hand section of Sector One and pick up the energy cell and the first set of plutonium rods. Return to Sector Three, pick up the energy cell and take the jet-pack. Take the Navigation Rom and descend to Sector One of the Ancient Shrine.

Fly past the two gaps with the Volgan soldiers until you reach the other jet-pack. Ignore it for the moment, drop your current pack and take the energy cell. Find and collect both pass cards, take the second jet-pack, return to the lift, and descend to Sector Two. Fly left, then up, to collect the pass card then continue left and get the key.

Run back to the lift and descend to Sector Three. Make your way across, avoiding the stomping pillars, but don't forget to pick up the two pass cards. Find and flick the switch to lower the rope, climb it and collect the spanner. Go up the lift to the other side of Sector Two.

If you collected the key from Sector Two, the pillar in front of you will now open. Take the second set of plutonium rods and the spring – in that order. You will find that every jump takes you much higher: You literally have springs on your feet. Go straight down to Sector One of the crew's quarters.

Run along the long passage at the top of the screen and be prepared to shoot on sight or set three mines and wait down the rope for the Volgans to kill themselves. Take the lift down to Sector Two. Take the key and the passcard, in that order, and open the doors to the jet-pack.

Return to Sector One and retrace your steps along the top passage until you are standing where you first entered the crew's quarters. Go down into the relaxation area, and work your way carefully across to the energy cell and the remote activator. Run back along the main passage for the last time, and climb down into the right-hand section of

```
   10 REM Mini-upgrade for Co
dename Droid disc
   20 REM by David Blackburn
   30 REM (C) The Micro User
   40 FOR I%=&70 TO &75:?I%=1
:NEXT
   50 MODE 7:*FX 202,32
   60 PRINT "Infinite lives?
(Y/N) ";:G$=GET$:IF G$="Y" TH
EN ?&70=0
   70 PRINT "Infinite mines?
(Y/N) ";:G$=GET$:IF G$="Y" TH
EN ?&71=0
   80 PRINT "Infinite blaster
 energy? (Y/N) ";:G$=GET$:IF
G$="Y" THEN ?&72=0
   90 PRINT "Infinite suit en
ergy? (Y/N) ";:G$=GET$:IF G$=
"Y" THEN ?&73=0
  100 PRINT "Infinite passcar
ds? (Y/N) ";:G$=GET$:IF G$="Y
" THEN ?&74=0
  110 PRINT "Infinite energy
cells? (Y/N) ";:G$=GET$:IF G$
="Y" THEN ?&75=0
  120 MODE5:VDU23,1,0;0;0;0;
  130 oscli=&FFF7
  140 FOR I%=0 TO 2 STEP 2:P%
=&900:[OPT I%
  150 LDX#b MOD256:LDY#b DIV2
56:JSR oscli:JMP a
  160 .b EQUS"LOAD STRYKER"+C
HR$(13)
  170 .a LDA#c MOD 256:STA &A
9A:LDA#c DIV 256:STA &A9B:JMP
 &A00
  180 .c LDA &70:BNE d:LDA#&A
5:STA &3273
  190 .d LDA &71:BNE e:LDA#&E
A:STA &3504:STA &3505
  200 .e LDA &72:BNE f:LDA#&E
A:STA &4588:STA &4589
  210 .f LDA &73:BNE g:LDA#&A
9:STA &3711:STA &3713:LDA#0:S
TA &2BA2:STA &3639:STA &48CD
  220 .g LDA&74:BNE h:LDA#&EA
:STA &1EE4:STA &1EE5
  230 .h LDA&75:BNE i:LDA#&EA
:STA &3813:STA &3814
  240 .i JMP &7700
  250 ] :NEXT
  260 CALL &900
```

Listing I: Codename: Droid mini-upgrade for 5.25in disc

TO POKE OR NOT TO POKE

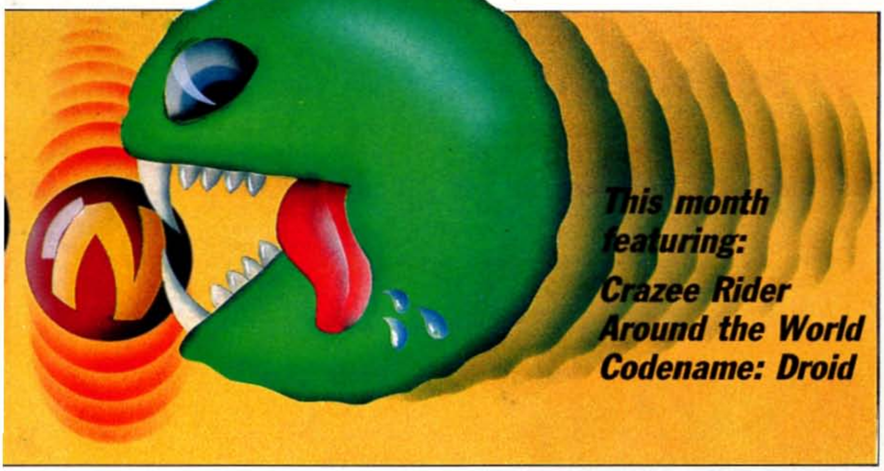
André Mas has written to me to ask if I have any pokes for English Software's **Kissing Cousins** and the two Superior titles **Around the World in Forty Screens** and **Crazee Rider**.

Unfortunately I have hardly seen Kissing Cousins. Certainly I have never received any pokes or tips for the game. Can anyone help?

The pokes printed in previous columns for the disc version of Repton 3 may be of use with the disc version of Forty Screens. I was not able to check this for certain before we went to press because I only have the game on cassette – but I'll do so as soon as I can.

Certainly the disc loader on Life of Repton is different, so pokes given previously will not work as they stand. However, pokes for these games may well appear in future columns.

As for Crazee Rider, what pokes could possibly be appropriate to the game? Apart from a routine to skip levels, a feature which becomes available anyway, the only one I can think of would be an invulnerability poke, but that would take away the point of the game. Just play honestly!



This month featuring:
Crazee Rider
Around the World
Codename: Droid

Sector One. Dispose of the two Volgans, then walk up to the Series 7000 Herbert droid. Drop a mine right next to him, walk on to it and he will explode.

Pick up the crate from the far side: Once again you will be two energy cells and six pass cards richer. Go back down to Sector Two, take the jet-pack and go quickly down to Sector Three. Pick up the pass card from the floor of the small room and go straight down to Sector Two of the missile factory.

Collect the spanner and the fuel, in that order, and go up to Sector One of the missile factory. Pick up the security pass card and go back even further to Sector Three of the crew's quarters. Pick up the energy cell. If you picked up the remote activator from Sector One of the crew's quarters, the lamp head will attach itself to the chain, allowing you past.

Pick up the floppy disc and the third set of plutonium rods and go back down to Sector One of the missile factory. Push the two control buttons – first the left-hand one, the second one you come to, then the right. If you push them in the wrong order you will be crushed by a crane. Keep heading left, making sure you pick up the energy cell, until you come to the lift.

Descend to Sector Two. Take the security pass card and the fourth set of plutonium rods, making sure you crawl under the cranes. Return to the lift and go down to Sector Three. Your way is blocked by a crane, so go down to the computer and put the disc into the drive: The crane will now rise. Proceed, and you will find an energy cell and the new Z11 spacecraft.

If you still can't attain inter-galactic hero status with this solution, look no further than Listings I and II – infinite-almost-everything for the 5.25in disc, tape and Master Compact versions of the game.

The 5.25in disc version, Listing I, was provided by David Blackburn of Rotherham, South Yorks. Enter it as shown, save it, run it and answer the questions.

Listing II is for both the cassette version and the Master Compact version and is slightly different. Type it in as shown, then save it. Each feature is clearly labelled. Simply delete the lines containing whichever you don't want in that particular game before typing RUN.

Cassette owners should position the original game tape just before the Droid file, as that is the one the tape loader searches for.

Lastly, I have been trying for some time to contact David Rhys-Jones, author of the BBC Micro versions of Ultimate's Jet-Pac and Atic Atac. Neither I nor Ultimate have seen any sign of him for well over a year. If he – or anyone who knows him – reads this, would they please contact me at *The Micro User*.

● *Next month I'll offer, among other goodies, pokes for a number of Compact games.*

HELP

Darren Hubbard has a game called **Condition:Red** by Blue Ribbon Software. I have not even heard of it, but it apparently features a Repton/Bonecruncher-style password system to jump to higher levels once you have completed them. Darren has found the first password but would like to know the rest.

Mark Spoors would like some help with Superior's excellent **Ravenskull**. Unfortunately he has neglected to tell me exactly – or even approximately – what is causing the problem, but I'm sure our many talented readers can help.

Carl Dimelow of Chesterfield, Derbyshire would like help with Domark's James Bond game, **The Living Daylights**. I have to say that I have not seen this game either, so any assistance will be greatly appreciated. Carl has managed to get to the fifth screen but cannot kill the man with the balloons. He has tried using all his available weapons, to no avail. Any ideas?

T.Pitt of Hagley, West Midlands is trying to trace a game called, apparently, **Fire Star – Dave Ace**. It seems to be a Repton-style game, but he does not know any more about it. Can anyone offer any assistance?

```
   10 REM Codename:Droid mini
-upgrade
   20 REM BBC tape and Master
 Compact disc version
   30 REM by Hac-Man 1988
   40 REM Dedicated to the me
mory of G.F.M.
   50 REM (C) The Micro User
   60 osargs=&FFDA
   70 A%=0:X%=&70:Y%=0:F%=USR
(osargs) AND &FF
   80 MODE 5:VDU 23,1,0;0;0;0
;:*FX15,0
   90 IF F%=1 THEN PROCtape E
LSE IF F%=8 THEN PROCadfs
  100 FOR I%=0 TO 2 STEP 2:P%
=&980:[OPT I%
  110 LDA#F%:CMP#1:BEQ tape1
  120 JSR &1F00:JMP pokes
  130 .tape1 JSR &900:LDA#&60
:STA &586B:JSR &5800
  140 .pokes LDA#&A5:STA &2A7
3:\ infinite lives
  150 LDA#&EA:STA &2D04:STA &
2D05:\infinite mines
  160 LDA#&EA:STA &3D88:STA &
3D89:\infinite blaster energy
  170 LDA#&A9:STA &2F11:STA &
2F13:LDA#0:STA &23A2:STA &2E3
9:STA INKEY40CD:\ infinite su
it energy
  180 LDA#&EA:STA &16E4:STA &
16E5:\ infinite lift usage
  190 LDA#&EA:STA &3013:STA &
3014:\ infinite extra energy
  200 LDA#F%:CMP#1:BEQ tape2
  210 JMP &6E00
  220 .tape2 LDX#&72:JMP &93C
  230 ]:NEXT
  240 CALL &980
  250 :
  260 DEFPROCtape
  270 !&900=&208D1FA9:!&904=&
8D09A902
  280 !&908=&0EA90221:!&90C=&
F42004A2
  290 !&910=&A034A2FF:!&914=&
FFF72009
  300 !&918=&04A20DA9:!&91C=&
08FFF44C
  310 !&920=&98488A48:!&924=&
03CAAD48
  320 !&928=&CA8DFE29:!&92C=&
68A86803
  330 !&930=&602868AA:!&934=&
52442E4C
  340 !&938=&0D44494F:!&93C=&
21586D4C
  350 ENDPROC
  360 :
  370 DEFPROCadfs
  380 PRINT"Insert Droid disc
 and press a key":A%=GET
  390 *MOUNT
  400 ?&C461=&90:*RUN STRYKER
  410 ?&1F2B=&36:!&2168=&60AA
00A9
  420 ENDPROC
```

Listing II: Codename:Droid mini-upgrade for cassette and Master Compact disc

Stelios Michael brings depth to a flat screen – a routine to create and move 3D shapes

Take off into the third dimension

SEEING three-dimensional objects being manipulated on your micro's screen can not only give a great deal of enjoyment – as with games like Elite – but also has more serious applications such as in the design of manufactured goods.

This program lets you display and rotate the model of a spacecraft along any axis and also move it around the screen. And by supplying the right data the animated object could be anything from a bottle to a house.

Key in the listing and ensure you've made no typing errors using Get it Right! Then save the program and when you run it you will be prompted to enter whether you want a line or solid version of the object.

In the solid display each side is filled in and outlined in black, but in the Archimedes version – on this month's disc – no black outline is necessary as each face is shaded and can be distinguished easily.

You can rotate the whole image about the three main axes as shown in Figure I, and you can move it nearer to or further from the viewpoint using Return and spacebar respectively. The object will always turn about the initial centre point so if it is moved away from this and then rotated it will describe a circular motion about it.

Three sets of data are used to hold the image of the object. The first set gives the three-dimensional cartesian coordinates of each corner point – each is given a number. The second contains data giving information about the faces and consists of a number specifying how many corner points make up the face, followed by the number of each point.

Using Figure II as an example, we have an object with only one face – a triangle – with the data:

```
3,6,1,2
```

The order of the points is important because it tells whether the face is visible – facing out of the screen – or invisible. The data must be arranged so that the corner points are listed clockwise. If when we come to display the face the corners cannot be read in clockwise order when placed on the screen the face is invisible.

In Figure IIa the points, reading clockwise, are 6,1,2. Rotating this object to face the other way about the y axis would make the face invisible (Figure IIb) since the points on the screen would now read 6,2,1. The third set of data simply gives the colour, and in this program –1 represents the main one – blue for the spacecraft. All three sets of data are held in arrays which are initialised at the start of the program.

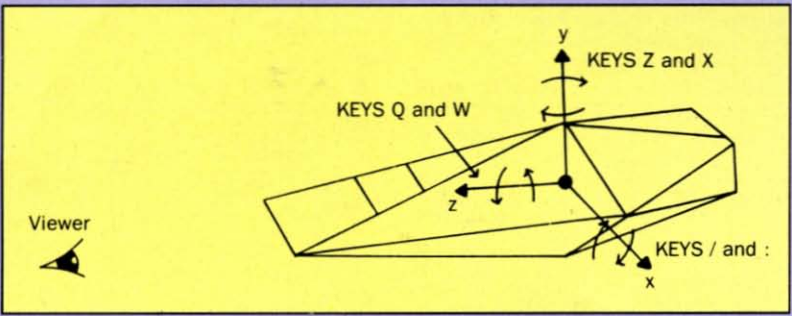


Figure I: Axes of rotation

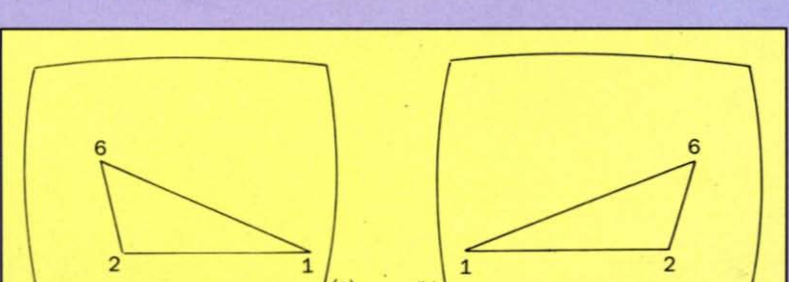


Figure II: Visible and invisible faces

Once the object is properly represented by the data your next step is to produce the 3D display. To do this take a corner point and draw an imaginary line between it and a focus, then calculate the X and Y coordinates of the point where the line cuts through the screen – see Figure III. Do this for every point and store the coordinates in a new array.

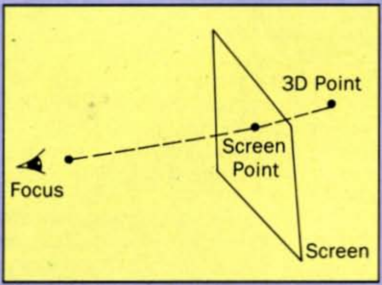


Figure III: Projecting a point on to the screen

Finally decide whether a face is visible before plotting it on the screen. This process involves a vector multiplication method called the cross product. If we call the two vectors **a** and **b**, this is calculated as:

$$\mathbf{a} \mathrm{x} \mathbf{b} = (y_a z_b - z_a y_b)i - (x_a z_b - z_a x_b)j + (x_a y_b - y_a x_b)k$$

Using the first three corners of the face to be checked, you first generate two vectors. Then calculate their cross product to produce a third vector perpendicular to the first two, as shown in Figure IV.

If this perpendicular vector is towards the viewer then the face is visible. The sign – whether positive or negative – of the Z component of the vector alone will tell you this, so you don't need to calculate the X and Y components. You only need:

$$x_a y_b - y_a x_b$$

In the Archimedes version the shade

PROCEDURES

Read–data	Reads point, face and colour data into arrays
Rotate–Z	Rotates object about the Z axis
Rotate–Y	Rotates object about the Z axis
Rotate–X	Rotates object about the Z axis
Translate	Moves the object closer or further away from the viewer
Change	Projects the three- dimensional coordinates on to the two-dimensional screen
Check–face	Checks which faces are towards the viewer
Which–face	Draws the visible faces
Draw–face	Draws a single face
Solid–face	Draws solid part of face

VARIABLES

Distance%	Distance between the centre of rotation of the object and the focus
COL%()	Array holding the face colour data
PNT()	Array holding the three dimensional corner point data
FACE%()	Array holding the face data
Scrn–pnts()	Array holding the two-dimensional screen
CK%()	Records which faces are visible
PINTS%()	Array holding the corner point data
CPOS	The value of COS when positive
SPOS	The value of SIN when positive
CNEG	The value of COS when negative
SNEG	The value of SIN when negative
D%	Distance between projection screen and the focus
E%	Key pressed flag

of the face is calculated by finding the angle between this vector and the Z axis.

To move the object forwards or backwards all you need to do is increase or decrease the Z coordinate of each corner point. To rotate a point, the two equations are:

$$X = x \cos \emptyset - y \sin \emptyset$$
$$Y = x \sin \emptyset + y \cos \emptyset$$

This operation is also carried out for every point, and since there are three axes of rotation there are three versions of it. In the program, rotation is in steps of 0.2 radians for each press of a key.

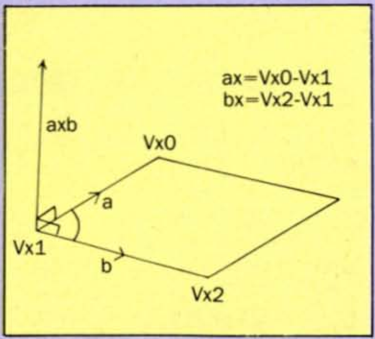


Figure IV: The cross product of two vectors

```
   10 REM PLOBAK
   20 REM by Stelios Michael
   30 REM (c) The Micro User
   40 MODE7
   50 PRINT"Line or solid? (L/S)";
   60 REPEAT QW$=CHR$(GETAND&DF)
   70 UNTIL INSTR("LS",QW$)>0:MODE1
   80 IF QW$="S" VDU19,7,4;0;
   90 VDU23;8202;0;0;0;
  100 numverts%=19
  110 numfaces%=17
  120 DIM col%(numfaces%)
  130 DIM pnt(2,19)
  140 DIM face%(numfaces%,3)
  150 DIM scr_pts%(1,numverts%)
  160 DIM ck%(numfaces%)
  170 DIM pnts%(numfaces%)
  180 cpos=COS(.2):spos=SIN(.2)
  190 cneg=COS(-0.2):sneg=SIN(-.2)
  200 D%=2000
  210 E%=1
  220 Distance%=500
  230 PROCRead_data
  240 REPEAT
  250 TIME=0
  260 IF INKEY-73 PROCRotate_X(cpos,spos
):E%=1
  270 IF INKEY-105 PROCRotate_X(cneg,sne
g):E%=1
  280 IF INKEY-98 PROCRotate_Y(cneg,sneg
):E%=1
  290 IF INKEY-67 PROCRotate_Y(cpos,spos
):E%=1
  300 IF INKEY-17 PROCRotate_Z(cpos,spos
):E%=1
  310 IF INKEY-34 PROCRotate_Z(cneg,sneg
):E%=1
  320 IF INKEY-99 PROCTranslate(-50):E%=
1
  330 IF INKEY-74 PROCTranslate(50):E%=1
  340 IF E%=1 PROCChange:PROCCheck_face:
PROCWhich_face:PRINTTAB(0,0);TIME/100
  350 E%=0:*FX15,1
  360 UNTIL FALSE
  370 DATA-30,0,-100
  380 DATA 30,0,-100
  390 DATA 60,0,65
  400 DATA-60,0,65
  410 DATA-25,8,100
  420 DATA 25,8,100
  430 DATA  0,25,50
  440 DATA-25,-8,100
  450 DATA 25,-8,100
  460 DATA  0,-25,50
  470 DATA-20,-8,-55
  480 DATA-18,-10,-40
  490 DATA 18,-10,-40
  500 DATA 20,-8,-55
  510 DATA-35,10,40
  520 DATA-30,6,-30
  530 DATA-25,14,25
  540 DATA 25,14,25
  550 DATA 30,6,-30
  560 DATA 35,10,40
  570 DATA 3,6,1,2
  580 DATA 3,0,1,6
  590 DATA 3,3,0,6
```

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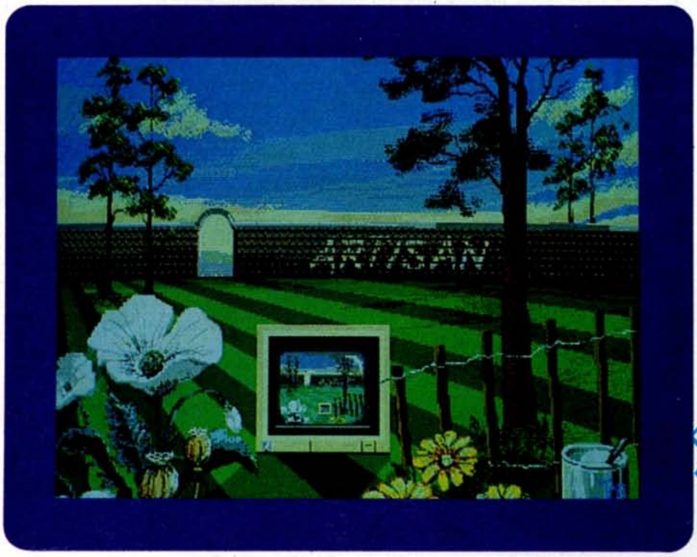
Archimedes
HARNESS THE POWER



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```
  600 DATA 3,3,6,4
  610 DATA 3,4,6,5
  620 DATA 3,5,6,2
  630 DATA 3,9,0,3
  640 DATA 3,1,0,9
  650 DATA 3,2,1,9
  660 DATA 3,2,9,8
  670 DATA 3,8,9,7
  680 DATA 3,7,9,3
  690 DATA 3,5,2,8
  700 DATA 4,5,8,7,4
  710 DATA 3,4,7,3
  720 DATA 4,10,11,12,13
  730 DATA 3,14,15,16
  740 DATA 3,17,18,19
  750 DATA -1,-1,-1,-1,-1,-1,-1,-1,-1
  760 DATA -1,-1,-1,-1,1,-1,2,2,2
  770 DEFPROCRead_data
  780 FOR Vertex%=0 TO 19
  790 READ pnt(0,Vertex%),pnt(1,Vertex%)
,pnt(2,Vertex%)
  800 NEXT
  810 FOR Face%=0 TO numfaces%
  820 READ pnts%(Face%)
  830 FOR Pnt_num%=0 TO pnts%(Face%)-1
  840 READ face%(Face%,Pnt_num%)
  850 NEXT:NEXT
  860 FOR Face%=0 TO numfaces%
  870 READ col%(Face%):NEXT
  880 ENDPROC
  890 DEFPROCRotate_X(C,S)
  900 FOR Vertex%=0 TO numverts%
  910 Z=pnt(2,Vertex%):Y=pnt(1,Vertex%)
  920 pnt(1,Vertex%)=Y*C-Z*S
  930 pnt(2,Vertex%)=Y*S+Z*C
  940 NEXT:ENDPROC
  950 DEFPROCRotate_Y(C,S)
  960 FOR Vertex%=0 TO numverts%
  970 Z=pnt(2,Vertex%):X=pnt(0,Vertex%)
  980 pnt(0,Vertex%)=X*C-Z*S
  990 pnt(2,Vertex%)=X*S+Z*C
 1000 NEXT:ENDPROC
 1010 DEFPROCRotate_Z(C,S)
 1020 FOR Vertex%= 0 TO numverts%
 1030 Y=pnt(1,Vertex%):X=pnt(0,Vertex%)
 1040 pnt(0,Vertex%)=X*C-Y*S
 1050 pnt(1,Vertex%)=X*S+Y*C
 1060 NEXT:ENDPROC
 1070 DEFPROCTranslate(T%)
 1080 FOR Vertex%=0 TO numverts%
 1090 pnt(2,Vertex%)=pnt(2,Vertex%)+T%
 1100 NEXT:ENDPROC
 1110 DEFPROCChange
 1120 FOR Vertex%=0 TO numverts%
 1130 A%=pnt(0,Vertex%)
 1140 B%=pnt(1,Vertex%)
 1150 C%=pnt(2,Vertex%)-Distance%
 1160 scr_pts%(0,Vertex%)=D%*A%/C%
 1170 scr_pts%(1,Vertex%)=D%*B%/C%
 1180 NEXT:ENDPROC
 1190 DEFPROCCheck_face
 1200 FOR F%=0 TO numfaces%
 1210 VX0%=face%(F%,0)
 1220 VX1%=face%(F%,1)
 1230 VX2%=face%(F%,2)
 1240 AX%=scr_pts%(0,VX0%)-scr_pts%(0,VX
1%)
 1250 AY%=scr_pts%(1,VX0%)-scr_pts%(1,VX
1%)
 1260 BX%=scr_pts%(0,VX2%)-scr_pts%(0,VX
1%)
 1270 BY%=scr_pts%(1,VX2%)-scr_pts%(1,VX
1%)
 1280 NZ%=AX%*BY%-AY%*BX%
 1290 IF NZ%>=0 ck%(F%)=1 ELSE ck%(F%)=0
 1300 NEXT:ENDPROC
 1310 DEFPROCWhich_face:CLS
 1320 FOR Face%=0 TO numfaces%
 1330 IF ck%(Face%) PROCDraw_face
 1340 NEXT:ENDPROC
 1350 DEFPROCDraw_face
 1360 IFQW$="S" PROCSolid_face:GCOL0,0 E
LSE GCOL0,7
 1370 K%=scr_pts%(0,face%(Face%,0))+640
 1380 M%=scr_pts%(1,face%(Face%,0))+512
 1390 MOVE K%,M%
 1400 FOR S%=1 TO pnts%(Face%)-1
 1410 DRAW scr_pts%(0,face%(Face%,S%))+6
40,scr_pts%(1,face%(Face%,S%))+512
 1420 NEXT:DRAW K%,M%:ENDPROC
 1430 DEFPROCSolid_face
 1440 IF col%(Face%)>-1 GCOL0,col%(Face%
) ELSE GCOL0,7
 1450 MOVE scr_pts%(0,face%(Face%,0))+64
0,scr_pts%(1,face%(Face%,0))+512
 1460 DRAW scr_pts%(0,face%(Face%,1))+64
0,scr_pts%(1,face%(Face%,1))+512
 1470 PLOT85,scr_pts%(0,face%(Face%,2))+
640,scr_pts%(1,face%(Face%,2))+512
 1480 IF pnts%(Face%)=3 ENDPROC
 1490 DRAWscr_pts%(0,face%(Face%,0))+640
,scr_pts%(1,face%(Face%,0))+512
 1500 PLOT85,scr_pts%(0,face%(Face%,3))+
640,scr_pts%(1,face%(Face%,3))+512
 1510 ENDPROC
>*:1.XS
```

Get it right!

```
  10 =    0 0 |  520 = EED3 F | 1030 = 4C7A B
  20 =    0 0 |  530 = 7DB3 0 | 1040 = 8326 4
  30 =    0 0 |  540 = 2380 3 | 1050 = 42E5 B
  40 = 8AFC C |  550 = B0E0 9 | 1060 = E531 C
  50 =  9BB B |  560 = 54A1 6 | 1070 = 68B1 A
  60 = 306C B |  570 = DC11 1 | 1080 = 94E6 3
  70 = B3BC B |  580 = 5110 8 | 1090 = BC7D C
  80 = D98E 1 |  590 = 88F2 1 | 1100 = E531 D
  90 = F716 2 |  600 = 1A10 B | 1110 = 9149 E
 100 = AF59 2 |  610 = 6DE5 2 | 1120 = 94E6 7
 110 = C23A 5 |  620 = B753 0 | 1130 = 7950 3
 120 = FFEC B |  630 = 9EF9 7 | 1140 = 2733 0
 130 = FF68 B |  640 = 3D9E E | 1150 =  44B 1
 140 = 38C3 7 |  650 = E47C 4 | 1160 =  C6A 3
 150 = EF6B 1 |  660 = 5DFC D | 1170 = 3CA7 A
 160 = A92E E |  670 = EABD 5 | 1180 = E531 E
 170 = 65BB 2 |  680 = CFC0 0 | 1190 = 27B9 6
 180 =  E55 E |  690 = CAD9 2 | 1200 = 6FBF C
 190 = A957 4 |  700 = 4DA3 3 | 1210 = 46D2 6
 200 = 7055 7 |  710 = 3A13 A | 1220 =  E82 F
 210 = EA54 C |  720 = B578 3 | 1230 = D672 4
 220 = 11AD 1 |  730 = F025 0 | 1240 = E51A 9
 230 = 4F12 3 |  740 = E0CE 3 | 1250 = 4339 9
 240 = BFBA B |  750 = 2158 4 | 1260 = 8280 A
 250 = 173E D |  760 = 1B4F 2 | 1270 = 24A3 0
 260 = D3B3 3 |  770 = FCD0 C | 1280 = 61A8 D
 270 = A066 5 |  780 = C1E2 3 | 1290 = BDFC F
 280 = 6299 9 |  790 = FB34 0 | 1300 = E531 3
 290 = B25D 2 |  800 = 2C83 1 | 1310 = 2C44 E
 300 = 7C97 1 |  810 = 2250 5 | 1320 = 2250 F
 310 = D0BE 6 |  820 = 2E40 A | 1330 = 839A 8
 320 = CDE8 8 |  830 = E3AF A | 1340 = E531 E
 330 = 2CB8 1 |  840 = 2DF1 F | 1350 = EC66 1
 340 = 352E A |  850 = 24BD 9 | 1360 =  B85 8
 350 = 8A30 0 |  860 = 2250 8 | 1370 = 3EB0 A
 360 = 226C 2 |  870 = 20FB 7 | 1380 = 710A B
 370 = 1A32 C |  880 = ED0F 0 | 1390 = F5EC 8
 380 = 9209 7 |  890 = 56C4 7 | 1400 = EA83 D
 390 = 3FDD C |  900 = 94E6 9 | 1410 = DB4F B
 400 = 69B9 5 |  910 = 32F4 5 | 1420 = 7B5E 9
 410 = 7C5E F |  920 = 9226 4 | 1430 = 6DC0 7
 420 = 226D E |  930 = A3A6 6 | 1440 =  94A 8
 430 = B961 6 |  940 = E531 5 | 1450 = DB0D 7
 440 = 1680 4 |  950 = 1364 2 | 1460 = C3D0 1
 450 = 9EBB 9 |  960 = 94E6 C | 1470 = A282 3
 460 = 1325 C |  970 = F595 C | 1480 = E892 7
 470 = C76C C |  980 = DA76 E | 1490 = 538D C
 480 =  31C D |  990 = 1BC7 3 | 1500 = FE78 D
 490 = 289C F | 1000 = E531 A | 1510 = ED0F 5
 500 = 4F57 4 | 1010 = DD84 C |
 510 =  A92 8 | 1020 = 8B92 0 |
```

Leaky listings

HERE's another in our series of leaky listings – programs that don't quite hold water.

A number of people have written in concerning problems typing in machine code. So, as an extra challenge, this month we thought we'd test you with an assembler program.

Although there are some obvious mistakes beware – there are a couple of devious ones too.

The corrections to make can be found on Page 110 along with some hints on good programming style. But do try to find as many errors as you can before looking at the answers. Hint: There are 10 (that we've spotted, that is).

```
100 REM Machine code hex input
110 REM (c) The Micro User
120 REM
130 MODE 7:FOR Q%=0 TO 2 STEP -2
140 P%=&C00
150 ]OPT P%
160 .printhex4
170 LDA &71:JSR printhex4
180 LDA &70
190 .printhex2
200 PHA:LSRA:LSRA:LSRA:LSRA:JSR one
210 PLA:AND &F
220 .one
230 CLS:SBC #9:BPL letter
240 ADC #58:JMP &FFE7
250 .letter
260 ADC #64:JMP &FFE7
270 [:NEXT:REPEAT
280 PRINT"Enter a decimal number: ";
290 INPUT N%
300 !&70=N%:PRINT ;N%;" is &";
310 CALL &900:PRINT " in hexadecimal"
320 PRINT:UNTIL TRUE
```

THE MICRO USER

PROGRAM Library No.14

Compiled by Steve Turnbull

THIS month we have several simple aids for the programmer – a routine to make saving Basic programs easier and quicker, a disc password system and a short program to print templates for disc jackets for when the old ones get lost or torn. Finally, we have a routine to personalise your BBC Micro start-up screen.

Title: Basic Saver
Language: 6502
Author: Anthony Walker

This is a short utility that uses the built-in *CODE command to save a Basic program using a filename held in the first REM statement of it.

It works by checking first that a program exists, then that a REM statement exists in the first line, and finally that the first character after the REM is a quote mark. Once all these checks have been made and passed, the routine generates the SAVE command with the filename from the REM command.

You run the main program to install the code and from that point any time you want to save a program just type: *CODE to activate the Basic saver routine.

```
   10 REM"CSAVER"
   20 page=&70:buff=&72:cr=&0D
   30 rem=&F4:osasci=&FFE3
   40 osbyte=&FFF4:userv=&200
   50 FOR L%=0 TO 2 STEP 2
   60 P%=&A00:[OPT L%
   70 .code
   80  LDA #21:LDX #0:JSR osbyte
   90  LDA #0:STA page:LDA &18
  100  STA page+1:LDY #1:LDA (page),Y

  110  CMP #&FF:BEQ noprog:LDY #3
  120 .remloop
  130  INY:LDA (page),Y:CMP #cr
  140  BEQ norem:CMP #rem:BNE remloop

  150  INY:LDA (page),Y:CMP #34
  160  BNE noquote:TYA:PHA:LDX #&FF
  170 .loop
  180  INX:TXA:PHA:LDA #138:LDY save,
X
  190  LDX #0:JSR osbyte:PLA:TAX:CPX
#5
  200  BNE loop:PLA:TAY
  210 .getfile
  220  INY:LDA (page),Y:STA buff:TYA

  230  PHA:LDA #138:LDX #0:LDY buff
  240  JSR osbyte:PLA:TAY:LDA buff
  250  CMP #34:BEQ addcr:CMP #cr
  260  BEQ exit:JMP getfile
  270 .addcr LDA #138
  280  LDY #cr:LDX #0:JSR osbyte
  290 .exit RTS
  300 .noprog
  310  OPT FNerr("No Program")
  320 .norem
  330  OPT FNerr("No REM")
  340 .noquote
  350  OPT FNerr("Missing " after RE
M")
  360 .save OPT FNequs("SAVE ""):BRK

  370 ]:NEXT
  380 userv?0=code MOD 256
  390 userv?1=code DIV 256
  400 END
  410 DEF FNerr(t$)
  420 P%?0=0:P%?1=0:P%=P%+2
  430 [OPT L%:OPT FNequs(t$):]
  440 P%?0=0:P%=P%+1:=L%
  450 DEF FNequs(t$):$P%=t$
  460 P%=P%+LENt$:=L%
```

Get it right!

```
10 =    0 0 |  90 =  45C 3 | 170 =  325 B | 250 = F3D6 8 | 330 = C861 8 | 410 = 30B3 7
20 = 89BA A | 100 = 34AF B | 180 = 3E70 D | 260 = 9EE9 B | 340 = F8D3 9 | 420 = F91A 3
30 = 99A2 C | 110 = 3824 F | 190 = A8E1 4 | 270 = 387B 4 | 350 = ABDB 0 | 430 =   E1 7
40 = D350 9 | 120 = E17D 9 | 200 = 3598 7 | 280 = 8419 7 | 360 = 4A10 7 | 440 = D33F 2
50 = AAB9 4 | 130 = 75D2 B | 210 = CE4B 1 | 290 = 2A36 4 | 370 = DA42 7 | 450 = 8785 4
60 = 6608 D | 140 = 6111 1 | 220 = 5D6C 2 | 300 =  CA8 2 | 380 = D660 B | 460 = B045 7
70 = 49A5 9 | 150 = 536F 8 | 230 = 1D86 5 | 310 = 20C5 8 | 390 = 9196 8 |
80 = FCAD 4 | 160 = 4D6A 2 | 240 = 2F6E 3 | 320 = 115F 8 | 400 = FD2E F |
```

Title: Break Message
Language: 6502
Author: John Jacobs

It is often nice to be able to personalise your BBC Micro with a start up message. This routine makes it easy for you by intercepting the break vector using osbytes 247, 248 and 249.

Although this program uses the vector for displaying a message, you can use it to jump to any location and carry out any code of your own.

The vector is called twice, once with the carry flag clear before the roms have been initialised, and then with carry set after initialisation.

This particular routine can be embedded in your own program and used to remind you that interrupt routines are still operating.

```
   10 REM Break Message
   20 REM by John Jacobs
   30 MODE7:B%=&70:J%=&60:C%=&980
   40 oswrch=&FFEE:osbyte=&FFF4
   50 REPEAT CLS
   60 PRINT"Your message, max 28 char
s:"
   70 INPUTLINE""M$:UNTIL LEN(M$)<29
   80 UNTIL LEN(M$)<21
   90 FOR L%=0 TO LEN(M$)-1
  100 B%?L%=ASCMID$(M$,L%+1):NEXT
  110 B%!L%=&FF0D0A0A
  120 FOR N%=0 TO 2 STEP 2
  130 P%=C%:[OPT N%
  140 .enter BCS ok:RTS
  150 .ok CLI:LDY #0
  160 .loop LDA B%,Y
  170  BMI exit:JSR oswrch
  180  INY:BNE loop
  190 .exit RTS:]
  200 P%=J%:[OPT N%
  210 JMP enter:]:NEXT
  220 Y%=0:FOR N%=0 TO 2
  230 A%=247+N%:X%=J%?N%
  240 CALLosbyte:NEXT:END
```

Get it right!

```
10 =    0 0 |  90 = 21EC 0 | 170 =  8EB A
20 =    0 0 | 100 = 377E F | 180 = 79A4 A
30 = CF50 0 | 110 = C278 D | 190 = DEBE 9
40 = 5C3E F | 120 = AC53 E | 200 = 6178 5
50 = 7452 4 | 130 = 4476 9 | 210 = 391B 1
60 = DF8B E | 140 = EF00 9 | 220 = F9B5 D
70 = EC06 2 | 150 = 7C73 D | 230 = BA07 4
80 = A250 A | 160 =  3B2 C | 240 = 97D8 2
```

Title: Password
Language: 6502
Author: Richard Owen

This program gives you password entry to a booted disc. Type in and save it, then insert the disc to be protected.

When you run the routine it asks you for the name of the program to be CHAINed from the disc – it has to be written in Basic – and for a seven letter password.

A machine code !boot program is saved on to the disc and the disc boot option changed to 2 – which means *RUN the boot file. When the new disc is booted with Shift+Break you are asked for the password and question marks appear for every key you press – you can delete as normal. When you press Return the password is checked and if correct the Basic program is CHAINed.

While this routine does not actually protect the disc from copying or backup it can be used as part of a more complex protection system.

```
   10 REM Password
   20 REM by Richard Owen
   30 MODE7:PROCinit
   40 PROCassem:PROCsave:END
   50 DEF PROCinit
   60 ptr=&70:off=&72:cr$=CHR$13
   70 spc$=STRING$(7," ")
   80 code=&900:oscli=&FFF7
   90 osrdch=&FFE0:osbyte=&FFF4
  100 oswrch=&FFEE:osword=&FFF1
  110 INPUT"Program to chain",$code
  120 I%=0:REPEAT code?I%=code?I%-1
  130 I%=I%+1:UNTILcode?I%=13:F$=$cod
e
  140 INPUT"Password",$code
  150 I%=0:REPEAT code?I%=code?I%+2
  160 I%=I%+1:UNTILcode?I%=13:P$=$cod
e
  170 ENDPROC
  180 DEF PROCassem
  190 FOR L%=0 TO 2 STEP 2
  200 P%=code:[OPT L%:CLI
  210  LDA #&C8:LDX #&01
  220  LDY #&00:JSR osbyte
  230  LDX #&00:LDY #&00
  240  LDA #&0F:JSR osbyte
  250 .begin
  260  LDA #&03:JSR oswrch
  270  JSR msg:LDX #&00
  280 .start
  290  JSR osrdch
  300  CMP #&7F:BEQ del
  310  CMP #&15:BEQ begin
  320  CMP #&0D:BEQ check
  330  CPX #&07:BEQ begin
  340  STA stacka,X:INX
  350  LDA #ASC"?":JSR oswrch
  360  JMP start
  370 .del
  380  CPX #&00:BEQ start:DEX
  390  JSR oswrch:JMP start
  400 .check DEX
  410  LDA psword,X:SEC:SBC #&02
  420  CMP stacka,X:BNE begin
  430  CPX #&00:BNE check:STX off
  440  LDA #&15:JSR oswrch
  450 .cloop LDX off
  460  LDA cmnd,X:BEQ exit
  470  CLC:ADC #&01:TAY:LDX #&00
  480  LDA #138:JSR osbyte
  490  INC off:JMP cloop
  500 .exit RTS
  510 .cmnd
  520  OPT FNequs("BG@HM!"+F$+"!")
  530  OPT FNequs(CHR$5+CHR$12+CHR$0)
  540 .msg
  550  LDA #ask MOD 256:STA ptr
  560  LDA #ask DIV 256:STA ptr+1
  570  LDY #0
  580 .prn LDA (ptr),Y:BEQ exit2
  590  JSR oswrch:INY:CPY #&35:JMP pr
n
  600 .exit2 RTS
  610  .ask OPT FNequs(CHR$22+CHR$7+"
Please enter the password:"+CHR$0)
  620 .psword OPT FNequs(P$+cr$)
  630 .stacka OPT FNequs(spc$+cr$)
  640 .params OPT FNequs(spc$+cr$)
  650 .stackb OPT FNequs(spc$+cr$)
  660 ]:NEXT:ENDPROC
  670 DEF FNequs(s$):$P%=s$
  680 P%=P%+LEN$P%:=L%
  690 DEF PROCsave
  700 PROCos("SA.!boot "+STR$~code+"
"+STR$~P%)
  710 PROCos("OPT4 2"):ENDPROC
  720 DEF PROCos($&700):LOCAL X%,Y%
  730 Y%=7:CALLoscli:ENDPROC
```

```
 10 =    0 0
 20 =    0 0
 30 = 916A A
 40 = 2CFB 7
 50 = 40D7 7
 60 = C289 0
 70 = B160 B
 80 = B67F 4
 90 = 8ACC E
100 = 6BA1 B
110 = C1D0 C
120 =  7B3 D
130 = 9523 2
140 = EC62 9
150 = 9D76 7
160 = 285C B
170 = ED0F 2
180 = B623 1
190 = AAB9 6
200 = 92BA A
210 = DB56 B
220 = 5C3F 5
230 = C0C7 7
240 = 4AA0 7
250 = 2F42 7
260 = DCEB 5
270 = 606B F
280 = 3208 3
290 = DFA2 A
300 = CD0B C
310 = 189B 6
320 = 3AEC E
330 = 60A3 D
340 = 14F9 2
350 = 321E 5
360 = 48C9 4
370 = 8B4A D
380 = 912F 5
390 = E4A8 8
400 = 377B 1
410 = CABB 8
420 = 8ACF 9
430 = 3C69 7
440 = 92B6 6
450 = 111A E
460 = EB09 1
470 = 5F72 9
480 = A7D2 5
490 = 326B 6
500 = 2A36 3
510 = D82F 3
520 = B26D E
530 = A3B9 9
540 =  D65 8
550 = 2116 0
560 = F697 1
570 = 9CF1 9
580 = E230 1
590 = C31E B
600 = 1D4D 0
610 = 5EC4 5
620 = 2758 0
630 = CB34 8
640 = ED86 B
650 = A50F B
660 = 953B 2
670 =  2E8 2
680 = 51B2 D
690 =  EB7 E
700 = 39A9 4
710 = D0A2 2
720 = 61B0 D
730 = FB84 3
```

Send your routines – with full details of the languages they are written in and the hardware/software requirements – on disc of tape to:

Steve Turnbull, Library, The Micro User, Adlington Park, Adlington, Macclesfield SK10 4NP.

Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Title: Disc Jacket Template
Language: Basic (any)
Author: A.J.Farmer

Having recently bought some 5.25in discs in bulk I was annoyed to find some of the jackets missing.

This short program solves the problem of missing, grubby or lost disc jackets by producing a printed template. You can either use very heavy printer paper and fold the printed copy or use it as a template on some card.

. The program uses no special characters and should work with any printer. If yours has any special graphics codes you can use those instead. One possible enhancement would be to put the disc catalogue on to the jacket as you print it.

```
   10 REM Template
   20 REM by A.J.Farmer
   30 MODE 3
   40 ON ERROR MODE7:PROCerror:END
   50 h$="_":v$="!":l$="/":r$="\"
   60 H$=STRING$(54,".")
   70 T$="Disc Envelope Template"
   80 PRINTTAB(12,2)T$'
   90 PRINT"This program prints a 5.2
5in disc jackets."'
  100 PRINT"Set up the printer, and p
ress Space...";
  110 REPEAT UNTIL GET=32
  120 REPEAT CLS:*FX3,10
  130 PRINTT$'SPC(6)STRING$(54,h$)
  140 FOR S%=0 TO 3
  150 PRINTSPC(4-S%)l$SPC(S%)v$;
  160 PRINTSPC(54)v$SPC(S%)r$:NEXT
  170 FOR L%=1 TO 15:PRINTv$SPC(4)v$;

  180 PRINTSPC(54)v$SPC(4)v$:NEXT
  190 FOR S%=3 TO 1 STEP -1
  200 PRINTSPC(4-S%)r$SPC(S%)v$;
  210 PRINTSPC(54)v$SPC(S%)l$:NEXT
  220 PRINTSPC(4)r$v$H$v$l$
  230 FOR L%=1 TO 25
  240 PRINTSPC(5)v$SPC(54)v$:NEXT
  250 FOR S%=0 TO 2
  260 IF S%=2 J$=h$ ELSE J$=" "
  270 Q$=STRING$(54-2*S%,J$)
  280 PRINTSPC(5+S%)r$Q$l$:NEXT
  290 PRINTSPC(6)"Cut out and fold al
ong dotted line. Fold tabs over and g
lue down."
  300 VDU12:*FX3
  310 PRINT"Another one? (y/n)";
  320 REPEAT
  330 A%=INSTR("YyNn",CHR$(GETAND&5F)
)
  340 UNTILA%>0:UNTILA%>2:PRINT:END
  350 DEF PROCerror:*FX3
  360 REPORT:PRINT" at ";ERL
  370 ENDPROC
```

```
 10 =    0 0
 20 =    0 0
 30 = 5016 6
 40 = B0C1 2
 50 = CA94 0
 60 = C4D8 C
 70 = 9E22 8
 80 = 92AD 8
 90 = 35EA 3
100 = 56A0 7
110 = 2B9E 5
120 = CB86 9
130 = 3A13 7
140 = A0B7 3
150 = E87E 4
160 = 350C 3
170 = FA17 B
180 = A3CB 2
190 = 3056 0
200 = 451C 1
210 = 8CF1 B
220 = 30E2 A
230 = D927 2
240 = 7979 D
250 = B096 C
260 = 3DC5 E
270 = 336C 6
280 = B081 6
290 = EEE9 8
300 = D755 8
310 = C092 0
320 = BFBA 7
330 = 7FE2 4
340 = 8197 8
350 = 59AB 7
360 = 752C 3
370 = ED0F 8
```

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Robin Nixon shows how to catalogue your precious music library

ON TRACK AND FEELING GROOVEY

IF you have a large record collection with many by the same artist it can often be difficult remembering which tracks are on which album.

This program makes it easier to index your record, compact disc or cassette collection. With a little modification it could be used to index books, stamp collections or floppy discs, among many other applications.

When you run the indexer you are presented with a main menu of three options: Add, delete or search records. Each record consists of a title and the artist's name of up to 25 characters, and up to seven tracks per side with a maximum of 16 characters each.

Each record is stored as a 274-byte block in a file and is indexed by moving the file pointer to the required place. When a record is deleted, its first byte is set to zero, so if you accidentally delete one it is possible to recover it.

However, you can only recover records if you haven't made any more entries, because deleted records are replaced with new ones to save space on the disc.

When you search for a record the program prompts you for a Find string which will then be matched against all entries in each record. So, searching for Simon will find all records made by Paul Simon and Simon and Garfunkle, as well as a few others.

The search is case specific, which means you'll have to type in a search string exactly as it appears in the record. This helps speed up the search procedure.

When a match has been found the whole record is displayed. If you are deleting you are then asked to confirm your choice, but if you are simply searching you can press N or the spacebar for the next matching record, or Return to go back to the main menu.

Although the indexer is intentionally simple, it should serve to illustrate the power of a dedicated database. If you begin to find it limiting then it's time to go on to a more powerful, commercially available package.

But, in the mean time, it will help to keep your record collection fully indexed.

```
 10 REM **********************
 20 REM *                    *
 30 REM *    ALBUM INDEXER   *
 40 REM *                    *
 50 REM *   By Robin Nixon   *
 60 REM * (c) The Micro User *
 70 REM *                    *
 80 REM **********************
 90 REM
100 MODE7:VDU 23;8202;0;0;0;:DIM rec$(
14),buffer% 274,search% 13:CLOSE #0:PROC
border:flag=0:dflag=0:PROCmenu:choice=0
  110 REPEAT:IF INKEY(-82) THEN choice=1
 ELSE IF INKEY(-66) THEN choice=2 ELSE I
F INKEY(-51) THEN choice=3
  120 UNTIL choice:PROCborder:*FX 15,1
  130 ON choice GOTO 140,180,200
  140 VDU 31,11,2,129,157,131:PRINT "SEA
RCH RECORDS";:VDU 32,32,156,31,3,5,135:P
RINT"ENTER SEARCH STRING: ";:PROCgetstri
ng(12):$search%=LEFT$(instring$,INSTR(in
string$,CHR$ 0)-1):L%=LEN $search%
  150 delete%=FALSE:channel%=OPENIN "DAT
A":IF channel%=0 THEN VDU31,10,12,132,7:
PRINT "DATA file not found":G$=INKEY$(20
0):CLOSE #channel%:RUN
  160 REPEAT:REPEAT PROCloaditem:UNTIL ?
buffer%>0 OR EOF#channel%:PROCcompare:IF
 flag=2 THEN RUN
  170 UNTIL EOF #channel%:PROCborder:VDU
31,14,11,132,7:PRINT "END OF FILE":G$=IN
KEY$(200):CLOSE #channel%:RUN
  180 VDU 31,12,2,129,157,131:PRINT "ADD
 RECORDS";:VDU 32,32,156,31,3,4,135:PRIN
T"TITLE : ";:PROCgetstring(25):title$=in
string$:VDU 31,3,6,135:PRINT"ARTIST: ";:
PROCgetstring(25):artist$=instring$
  190 FOR N%=1 TO 14:rec$(N%)=STRING$(16
,CHR$ 0):NEXT:PROCtracks(0):PROCtracks(1
):PROCsave:PROCborder:VDU31,7,11,132:PRI
NT"Add another record (Y/N)? ";:G$=GET$:
IF G$="N" THEN RUN ELSE PROCborder:GOTO
180
  200 VDU 31,11,2,129,157,131:PRINT "DEL
ETE RECORDS";:VDU 32,32,156,31,3,5,135:P
RINT"ENTER SEARCH STRING: ";:PROCgetstri
ng(12):$search%=LEFT$(instring$,INSTR(in
string$,CHR$ 0)-1):L%=LEN $search%
  210 delete%=TRUE:channel%=OPENIN "DATA
":IF channel%=0 THEN VDU31,10,12,132,7:P
RINT "DATA file  not found":G$=INKEY$(20
0):CLOSE #channel%:RUN
  220 REPEAT:REPEAT PROCloaditem:UNTIL ?
buffer%>0 OR EOF#channel%:PROCcompare:IF
 dflag=1 THEN ptrtemp1%=PTR#channel%:PTR
#channel%=ptrtemp%:dflag=0:BPUT #channel
%,0:PTR#channel%=ptrtemp1%
  230 UNTIL EOF #channel%:PROCborder:VDU
31,14,11,132,7:PRINT "END OF FILE":G$=IN
KEY$(200):CLOSE #channel%:RUN
  240 END
  250 DEFPROCborder:CLS:VDU 132,157:FOR
A%=1 TO 23:VDU 31,0,A%,148,255,31,38,A%,
148,255:NEXT:VDU 132,157:ENDPROC
  260 DEFPROCmenu:VDU 31,11,3,129,157,13
1:PRINT "ALBUM INDEXER";:VDU 32,32,156
  270 VDU 31,10,10,134:PRINT "S -  Searc
h file":VDU 31,10,12,134:PRINT "A -  Add
 records":VDU 31,10,14,134:PRINT"D -  De
lete records":VDU 31,6,21,135,136:PRINT
"Please enter your choice";:VDU 137:ENDP
ROC
  280 DEFPROCgetstring(number):instring$
="":VDU 255,8:len=0:g$="":REPEAT:g$=GET$
:IF g$=CHR$ 127 THEN PROCdelete:GOTO 300
  290 IF g$<>CHR$(13) AND len<number THE
N PROCadd
  300 UNTIL g$=CHR$ 13:VDU 32:instring$=
instring$+STRING$(number-LEN(instring$),
CHR$ 0):ENDPROC
  310 DEFPROCdelete:IF len>0 THEN instri
ng$=LEFT$(instring$,LEN(instring$)-1):le
n=len-1:VDU 32,8,8,255,8
  320 ENDPROC
  330 DEFPROCadd:instring$=instring$+g$:
PRINT g$;:VDU 255,8:len=len+1:ENDPROC
  340 DEFPROCtracks(side):VDU 31,3+side*
17,8,133:PRINT"SIDE ";side+1:FOR trck=1
TO 7:VDU31,3+side*17,8+trck*2,134:PROCge
tstring(16):rec$(trck+side*7)=instring$:
IF LEFT$(instring$,1)=CHR$ 0 THEN trck=7
  350 NEXT:ENDPROC
  360 DEFPROCsave:channel%=OPENIN "DATA"
:IF channel%=0 THEN CLOSE #channel%:chan
nel%=OPENOUT "DATA":PROCdosave:GOTO 400
```

Turn to Page 60 ►

◀ From Page 59

```
  370 saved=FALSE:REPEAT:C%=BGET #channe
l%:IF C%=0 THEN PTR#channel%=PTR#channel
%-1:PROCdosave ELSE PTR #channel%=PTR #c
hannel%+273
  380 UNTIL EOF #channel% OR saved
  390 IF NOT saved PROCdosave
  400 CLOSE #channel%:ENDPROC
  410 DEFPROCdosave:FOR char=1 TO 25:BPU
T #channel%,ASC(MID$(title$,char,1)):NEX
T:FOR char=1 TO 25:BPUT #channel%,ASC(MI
D$(artist$,char,1)):NEXT:saved=TRUE
  420 FOR rec=1 TO 14:FOR char=1 TO 16:B
PUT #channel%,ASC(MID$(rec$(rec),char,1)
):NEXT char,rec:ENDPROC
  430 DEFPROCloaditem:ptrtemp%=PTR#chann
el%:FOR X%=0 TO 273:buffer%?X%=BGET#chan
nel%:NEXT:ENDPROC
  440 DEFPROCcompare:FOR X%=0 TO 273-L%:
IF buffer%?X%=0 THEN REPEAT X%=X%+1:UNTI
L buffer%?X%>0 OR X%=274:IF X%=274 THEN
GOTO 470
  450 F%=TRUE:FOR Y%=0 TO L%-1:C%=buffer
%?(X%+Y%-1):IF C% <> search%?Y% OR C%=0
THEN F%=FALSE:Y%=L%
  460 NEXT:IF F% THEN:PROCdisplay:IF del
ete%=TRUE PROCdelyn:X%=273 ELSE IF F% TH
EN PROCselect:X%=273
  470 NEXT:ENDPROC
  480 DEFPROCdisplay:PROCborder:VDU 31,3
,4,135:PRINT "TITLE : ";:FOR J%=0 TO 24:
VDU buffer%?J%:NEXT:VDU 31,3,6,135:PRINT
 "ARTIST: ";:FOR J%=25 TO 49:VDU buffer%
?J%:NEXT
  490 VDU31,3,8,133:PRINT "SIDE 1":FOR J
%=0 TO 6:VDU 31,3,10+J%*2,134:FOR K%=0 T
O 15:VDU buffer%?(J%*16+K%+50):NEXT K%,J
%
  500 VDU31,20,8,133:PRINT "SIDE 2":FOR
J%=0 TO 6:VDU 31,20,10+J%*2,134:FOR K%=0
 TO 15:VDU buffer%?(J%*16+K%+162):NEXT K
%,J%:ENDPROC
  510 DEFPROCselect:VDU 31,4,2,129:PRINT
"N Next match,  RETURN Main Menu";:G$=GE
T$:IF G$="N" OR G$="n" THEN flag=1 ELSE
IF G$=CHR$ 13 THEN flag=2
  520 ENDPROC
  530 DEFPROCdelyn:VDU 31,9,2,129:PRINT"
Delete record (Y/N)? ";:dflag=0:G$=GET$:
IF G$="Y" OR G$="y" THEN dflag=1
  540 ENDPROC
```

Get it right!

10 = 0 0	190 = 7EB3 3	370 = 6928 A
20 = 0 0	200 = E251 A	380 = 4630 0
30 = 0 0	210 = CA95 0	390 = 2BFC 5
40 = 0 0	220 = BCDE 6	400 = F291 5
50 = 0 0	230 = 64A1 D	410 = BFAF 6
60 = 0 0	240 = FD2E 5	420 = 6F1B 3
70 = 0 0	250 = 5447 8	430 = 8A90 9
80 = 0 0	260 = E880 1	440 = AD63 A
90 = 0 0	270 = F13E D	450 = 6DB9 B
100 = D74D D	280 = 4CA0 F	460 = 2AAF 7
110 = 635A E	290 = 2260 5	470 = E531 1
120 = 7A42 3	300 = 3C45 4	480 = 5EB9 7
130 = 5EC1 E	310 = EE11 C	490 = 3605 8
140 = 3091 6	320 = ED0F C	500 = B496 D
150 = 31EC E	330 = DB52 2	510 = FFDC B
160 = B6DD A	340 = 9A81 7	520 = ED0F 4
170 = 64A1 4	350 = E531 C	530 = 154F 3
180 = 43E7 6	360 = B647 E	540 = ED0F 1

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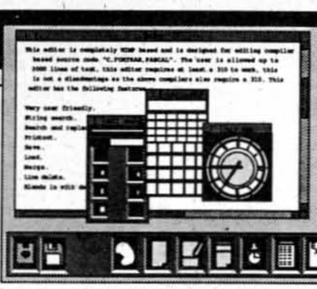

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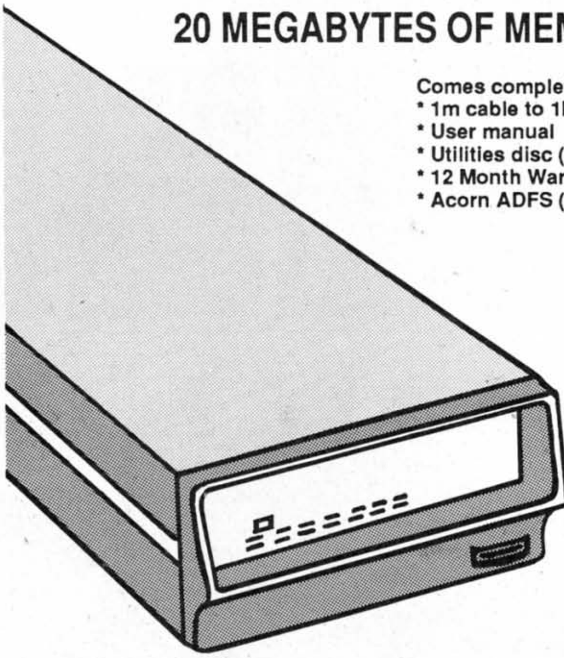

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Perk up Basic with Pipedream

Peter Davidson investigates a routine to add a missing feature to your Z88

ONE of the biggest problems when you're entering Basic programs into the Z88 is the lack of any editing facilities. However, Cambridge Computer has supplied *The Micro User* with this routine which fills the gap and makes Basic much more user friendly. It can easily be added to the end of any Basic program under development.

Type the listing into Pipedream exactly as shown – including .J at the start – and save it using the filename :RAM.O/ED with the Save plain text option set to Yes.

If you prefer, you can use a word processor on your BBC Micro and transfer the listing to your Z88 when it's complete, but in either case note that the program should be typed into a word processor, and not Basic.

The routine is then ready to append to the end of any Basic program you are working on. To do this, enter the Basic environment and type:

```
*CLI .*:RAM.0/ED
```

You'll see the routine being *typed* into the Z88 in a similar way to when you *EXEC a file on your BBC Micro. Note that you can use this method to create any Basic program in Pipedream and then transfer it to Basic, but if you want to enter a new program rather than append a routine remember to type NEW first.

To edit a line just type:

```
PROCE(line)
```

After a short delay the line will be presented on the screen for you to edit, using the left and right arrow keys to move along it. A gap is created as you insert characters, and the space created as you delete them is automatically closed up.

If you press Enter the edited line will be accepted, while Escape leaves it in its original form.

That's all there is to adding the missing feature to the BBC Basic of the Z88. Now you can enter programs without worrying about having to re-type the whole line because of a simple typing error.

```
.J
60000 END
60010 DEF PROCE(B)
60020 REM Cambridge Computer Ltd.
60030 IF B=0 THEN ENDPROC
60040 A=OPENOUT":RAM.0/EE.CLI"
60050 B$=":RAM.0/E.CLI"
60060 PRINT#A,".>"+B$
60070 PRINT#A,".J","LIST"+STR$(B),"PROCF"
60080 CLOSE#A
60090 *CLI .*:RAM.0/EE.CLI
60100 ENDPROC
60110 DEF PROCF
60120 A=INKEY(0)
60130 A=OPENIN B$
60140 INPUT#A,A$,A$
60150 CLOSE#A
60160 A=OPENOUT B$
60170 PRINT#A,".J",A$
60180 PTR#A=PTR#A-1
60190 BPUT#A,0
60200 CLOSE#A
60210 *ERASE :RAM.0/EE.CLI
60220 VDU8
60230 OSCLI"*CLI .<"+B$
60240 ENDPROC
```

ASTRONOMY

This month's Body Building project is a simply made theodolite which you can use to map the stars' positions. To help you find them a listing is given and, with minor modifications, it works equally well on a Z88 or BBC Micro.

The portability of the Z88 makes it an ideal companion to the theodolite, so, if you're interested in the night sky, turn to page 132.

The program works on a Z88 if the following lines are changed.

```
  10CLS
  20PRINT "BEEB BODY BUILDING COURSE"
  30PRINT "April 1988"
  40PRINT "By Mike Cook"
  60PRINT "STAR FINDER for ";Y%
  70PRINT "Set year in line 50"
  80PRINT"PRESS SPACE":X=GET:CLS
 120PRINT TAB(0,1);"Longitude West ";
 160PRINT TAB(0,3);"Latitude ";
 400PRINTTAB(0,7);"Press SPACE
   to change the STAR"
 430PRINTTAB(0,0);"Location of
   ";D$;" L.Y.";SPC(15)
 480PRINTTAB(0,2);
 520UNTIL INKEY(10)=32
1060CLS
1070REM
1080REM
```

Boldly going italic . . .

IN Pipedream effects like bold and italic are easy to achieve. Next month we reveal how to obtain them from Basic and how you can create windows on the Z88. Also we see how a brewery is using the Cambridge Computer micro and review the first game to be released on cartridge.

Print it out with your micro slave

John Allen shows how you can get hard copy from your Z88 portable

HAVING a computer like the Z88 is all very well, but for it to be useful you need to be able to get some sort of printed output from it. One of the ways to do this is to transfer files to a BBC Micro, format them with a word processor, then produce the output on the BBC Micro's printer.

This procedure, described in the January issue of *The Micro User*, can cause problems. Connecting directly to the Z88 means another lead which, if the printer only has a parallel interface, is costly and generally involves fiddling with those tiny DIP switches hidden inside it.

Here we describe another approach: Using your BBC Micro as a slave to the Z88.

If you can transfer files you already have a serial lead to connect the two machines together. If not, see the offer on Page 76 of this issue. All you have to do is use it to join the serial ports together, run our handy little Printer Server program and, whenever you print from the Z88, the output appears on the BBC Micro's parallel printer.

This approach has another advantage – it helps you to avoid a bug in the Z88's Pipedream printer driver.

The program to make the BBC Micro do this is very simple. It just takes the data being sent from the Z88 and directs it to the printer using the normal BBC Micro printer options. Straightaway you can use Pipedream highlights such as bold or underline, and effects like centring, without needing to have the BBC Micro View Professional package.

Key the listing in to your BBC Micro and use Get it Right! to ensure you have made no errors. To use the routine, first select the Z88's Panel utility – □S. The transmit speed needs to be set to 9600, parity should be NO and Xon/Xoff should be NO. Then run the program on the BBC Micro and the Z88's output will be directed to the printer until you press Escape.

Printing from Basic

The Z88 uses BBC Basic as the programming language but as the hardware, such as the printer, is controlled in a different way *FX3 and the VDU command do not have any effect on the printer – the *FX command does not exist.

In Z88 BBC Basic there are two main ways to send output to a printer and so to the BBC Micro acting as a printer server – the Z88 cannot tell the difference.

The screen output can be redirected so that it also goes to the printer – the equivalent of Control+B or VDU2 on the BBC Micro. Or, and this is an additional feature of Z88 BBC Basic, the printer can be opened as an output file and data can be printed in the same way as writing to a file.

By opening the printer as an output file you have independent control of screen and printer output.

Let's look first at the easiest option, redirecting all screen output to the printer. This is done by entering □ followed by +P from the Basic command prompt before running the program. After the program has finished, the redirection can be cancelled by entering □–P.

This is similar to using Control+B and Control+C on the BBC Micro. When you print in this way the Z88 printer driver is used for things like the printer setup. This method does however send all sorts of control codes whenever you enter characters from the keyboard which, on most printers, produces messy output.

To redirect just some of the output

PRINTING FROM PIPEDREAM

The Z88 printer driver has a rather nasty bug – the option to print without sending line feeds does not work. In fact, selecting that option sends null characters (zeros) at the end of lines in place of line feeds and carriage returns.

This means that the driver can only be set so that Allow line feed *is YES in order to get anything meaningful on any printer.*

On a BBC Micro, by default, all line feeds – Ascii 10 – are filtered out when characters are sent to the printer. This means that one of the dip switches in the printer has to be set to make the printer automatically feed a line whenever it does a Return.

As double spaced text, for example, is sent to the printer by Pipedream with one Return followed by two line feeds between each line of text, the server program checks for these multiple line feeds and makes sure that all line feeds are matched with a corresponding Return.

To print from Pipedream, press ◊PO followed by Enter. Using our utility, all your Pipedream commands will be obeyed by the printer.

Pipedream – and View Professional – assumes that you correctly calculate the page layout. If you want double spacing, the margins – top, header, footer and bottom – together with any headers and footers must add up to an even number of lines to insert at the top and bottom. Otherwise Pipedream will print one line more than the page length.

To get no page breaks set Page Length to 0. If you set the length to a number greater than 255 strange things will happen in Pipedream.

under the control of a program – the equivalent of using VDU2 and VDU3 on the BBC Micro – use can be made of one of the Z88's undocumented star commands – *CLI – to allow use of the Z88's operating system.

To do this first set up two files using Pipedream and save them as plain text. The first, with the name of PRINTERON, containing two lines:

```
#+P
.S
```

The second file, called PRINTEROFF, should contain:

```
#-P
.S
```

To turn the printer on during a program – the equivalent of VDU2 – use:

```
*CLI .*PRINTERON
DUMMY=INKEY(0)
```

The *CLI command runs PRINTERON as a command file: This redirects output and closes the CLI down, retaining the redirection. The INKEY statement is a dummy – a bodge – which forces an interrupt to occur on the Z88 so that the *CLI command is executed immediately. Otherwise the micro waits until the end of the program before executing it – not very useful. Similarly to turn the printer off during the running of a program use:

```
*CLI .*PRINTEROFF
DUMMY=INKEY(0)
```

Z88 STAR COMMANDS

Z88 BBC Basic contains the following star commands:

*CLI <Filer CLI instruction> allows access through Basic to the CLI commands in the Filer.

*DELETE <filename> or *ERASE <filename> does the same as *DELETE on the BBC Micro.

*RENAME <file1> <file2> renames a file in the same way as *RENAME on the BBC Micro.

*NAME <file> gives a file a name that appears in the suspended activities menu.

All these commands can be used either after the Basic prompt or within programs where the same rule about star commands having to be the last statement on a line applies as on the BBC Micro.

This can be avoided by using OSCLI and putting the command in a string as in:

```
OSCLI "DELETE FILE1"
```

In a program, *CLI is only executed after an interrupt so it should be followed by a statement – such as INKEY – which forces one.

```
 10 REM Z88 Printer Server
 20 REM by John Allen
 30 REM (c) The Micro User
 40 :
 50 ON ERROR GOTO 170
 60 PRINT "Transferring from Z88 tc
    printer ...."'
 70 *FX15,0
 80 *FX7,7
 90 *FX3,10
100 *FX2,1
110 :
120 A%=GET
130 IF A%=10 AND B%=10 THEN VDU13,
    10 ELSE VDU A%
140 B%=A%
150 GOTO 120
160 :
170 *FX3,0
180 *FX2,0
190 PRINT "Printer Server finished."
200 END
```

Get it right!

```
 10 =    0 0     110 = 9719 8
 20 =    0 0     120 = E398 8
 30 =    0 0     130 = 66D1 F
 40 = 9719 9     140 = 132E D
 50 = 663C 6     150 = 2C6A 9
 60 = 8D96 1     160 = 9719 A
 70 = 6C86 4     170 = 7632 B
 80 = DA15 2     180 = 4102 7
 90 = 2933 5     190 = 93ED B
100 = 5123 5     200 = FD2E 8
```

Printer server program

The printer as a file

To take the other approach – opening the printer as a file – you need to use the device COM.0 – the serial port – in place of the filename in an OPENOUT statement. This statement would then become something like:

```
X%=OPENOUT":COM.0"
```

After that data can be sent to the printer using BPUT#X% or PRINT#X%. When there's nothing more to print the channel is closed with:

```
CLOSE#X%.
```

The action of PRINT# on the Z88 is not the same as on the BBC Micro, where everything is stored in what Acorn calls an *internal format* which means any output would be meaningless on a printer. On the Z88, PRINT# sends strings in the same way as PRINT – except that each string is always followed by a Return – but only the low bytes of numbers are sent as with BPUT#.

Integer and real numbers can be printed using PRINT# with the Basic STR$ function which takes a numeric argument and converts it to a string. So:

```
PRINT#X%,STR$(100.37)
```

after the printer has been opened on channel *X%* would print 100.37 followed by a Return. To print *The number is 100.37* you would use the instruction:

```
PRINT#X%,"The number is "+STR$(100.37)
```

Note that + has been used between the strings to prevent Return being sent before the number.

If your printer needs a line feed to be sent as well as the carriage return, the last item in each PRINT# statement has to be +CHR$(10).

Finally, since you can run BBC Basic programs on the BBC Micro, what's the advantage of running them on the Z88? Three come to mind straightaway.

You can make use of Z80 processor machine code, you can use data stored on the Z88 and, probably most important, you have more space. The Z88 gives Basic up to 40k of memory – an enormous increase in the size of arrays and programs possible.

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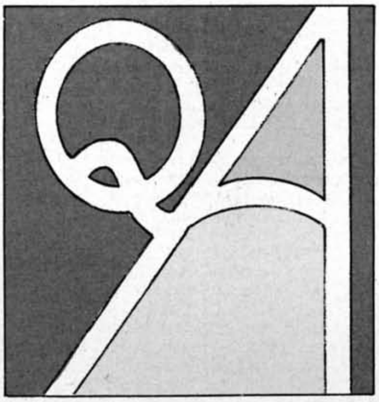

We are receiving a large number of questions about the Acorn Archimedes. Some of them are answered here, and we will be answering more over the next few months.

So, if you have any questions about the new super micro from Acorn don't hesitate to send them to: Archimedes Questions, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Q **I would like to use the bit image mode on my printer. In order to activate this I need to send an Escape code to the printer first but, looking through the Archimedes user guide there isn't one.**

Could you please tell me how I can set this mode from my Archimedes and how do I print the BFONT set of characters?

A *Escape is the Ascii character 27 – in decimal – so to send it to your printer use the statement VDU 1,27. The 1 ensures that it is sent only to the printer and not to the display, and remember the printer must first have been enabled with a VDU 2.*

There is no simple way to print out the BFONT from the Archimedes directly, and the best solution is to use one of the screen dumps supplied on the Welcome Disc or in the operating system.

Numbers galore

Q **How can I extend the numeric range of my Archimedes 310 beyond its present integer and floating point limit of +2147483647 and $+1.7\times10^{23}$ respectively, possibly by using the FPE2 emulator?**

A *Using the floating point emulator it is possible to have two precisions, normal and extended. The details of the format are given in the book Arm Assembly Language Programming by Pete Cockrell, and you could then use this from machine code.*

Alternatively using Acorn's C compiler you can access the extended precision format easily and this gives a range of numbers with 18 significant digits with an exponent of plus and minus 308. We know of no way of using this format from Basic.

Expanding Archimedes

Q **What exactly – apart from extra memory and drives – is the difference between the 300 and 400 series?**

A *The difference is in the expandability: With the 400 series you can have four internal podules, one of which can be a co-processor. A co-processor in this context is not like the second processor concepts on the earlier machines, but a chip to extend the instruction set of the Arm – for example to add floating point or graphics.*

Without a co-processor the operating system can be made to emulate these extra instructions, for example using the floating point module.

Safe serial connections

Q **Watford Electronics sells a serial kit to allow a BBC B to be linked to an Archimedes. But I've heard Acorn has said the use of a connecting cable to an external 5.25in disc drive will invalidate the guarantee and may well damage the Archimedes. This is rather confusing – isn't it safe to connect serial port to serial port?**

A *There seems to be a crossed line here. There is nothing wrong with connecting up the micros using a serial cable, and the Watford system is perfectly safe.*

But Acorn says you shouldn't connect an external 5.25in disc drive directly to the Archimedes as the signal drive requirements of some of these exceeds that which the Archimedes can supply

So it could damage the Archimedes drive circuitry, and as it involves modifying or replacing the internal cabling it could void the warranty. However, we have successfully used a Cumana twin size drive – one large and one small – with no ill effects.

Welcome with a mouse

Q **What, apart from the machine and its components, actually comes with the Archimedes? Is this the same for both the 300 and 400 series?**

A *The mouse comes with the Archimedes – both series – and it plugs into the keyboard. You also get a user guide telling you about the machine, a Welcome Disc with some demonstration programs and utilities and a Welcome Guide telling you about the software on the disc.*

A lot more memory

Q **How much ram has the Archimedes compared with the BBC Micro's 32k?**

A *Whereas the BBC Micro has 32k the Archimedes 305 has 512k and the 301 has 1024k. However, just like the BBC Micro, not all this is free to use in your own program. It depends on how much you allocate for various purposes like screen memory. But as you can see, it still has a lot more.*

Kitted up with latest OS

Q **Is the Archimedes still being sold without all the operating system and memory with the intention of being upgraded through a special registration system? Will the 400 series also be sold like this?**

A *Originally the Archimedes was sold with an early version of the operating system – either 0.2 in eprom or 0.3 in rom. None were ever sold without all the memory installed.*

A registration whereby Acorn would send you the final version 1.2 free came with the earlier roms. All new machines now have the final version installed and the 400 series comes complete with it.

ARCHIMEDES & BBC SOFTWARE

INTER-**CHART**

A general purpose chart and graph plotting program that can display data in the most easily understood format—graphically.

While it integrates directly with other members of the 'INTER' family it can also accept data from ASCII files, produced by WORDWISE, VIEW and programming languages such as BASIC.

Supports line, and bar graphs, pie charts and also scatter graphs. These may be automatically scaling, or the user may view any portion of the scale so allowing 'zooming' into any area of interest.

Pie charts may have highlighted segments (pulled out) with the values optionally displayed as percentages.

All graph displays may have optional text headings or messages positioned anywhere on screen. These are saved with the graph and may be edited at any time.

Multiple graphs can be held in memory at the same time. Any number of graphs may be overlaid allowing easy comparisons etc. (Not applicable to pie charts.)

Graphs may be displayed in any BBC graphics mode. The colours of bars, lines, or segments may be altered from a simple table of colours. In addition special striped colour combinations and a variety of cross hatching styles are available for bar charts.

Where appropriate either axis may be displayed with a log or linear scale, and optional dotted graduation lines are available.

INTER-CHART has built in screen dump routines for EPSON matrix printers and compatibles. Other screen dump routines may be used from within (or external to) INTER-CHART for other printers or plotters.

BBC ROM—£32.00+VAT (£36.80 incl.)
Archimedes ROM £25+VAT (£28.75 incl.)

INTER-**WORD**

The ultimate word processor for the BBC Micro.

The most comprehensive WYSIWYG image of the final page showing at all times, page breaks, headings, footings, bold text, underlines etc, ensuring the page on screen looks as close as possible to the final printout.

Works in 40, 53, 80 or a special 106 column screen mode and offers super-fast scrolling in all modes, even sideways scrolling if necessary.

All margin and tab settings are controlled by rulers placed in the text. These may be altered by moving the cursor onto the ruler and simply dragging the required margin or tab to the new position. All text controlled by the ruler is instantly re-formatted to the new settings.

Pull down menus may control nearly all operations—no complicated commands to remember. This ensures that it really is easy to use.

Printer control menu allows easy access to all printers' special effects and allows easy configuring to any printer. Printer codes may be saved and re-loaded—no need for special printer drivers.

A special multi-file mode enables very long documents to be generated, even to the size of a disc, yet enables simple movement to any page in the document.

File selector for all file operations. This enables fast and very simple file name selection when saving, loading etc.

Integrates directly with other members of the INTER family and with SPELLMASTER, the fastest and most flexible spelling checker available for the BBC.

BBC ROM £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

INTER-**SHEET**

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The fastest spreadsheet available for the BBC Micro.

The largest capacity spreadsheet. This means more data and larger spreadsheets are possible.

40, 80 and a special 106 column screen mode. Especially useful for viewing large sheets.

Multiple spreadsheets in memory at once. Data from one may be included in the calculations of other sheets.

Super-fast replication allows anything from a single box to an area of the sheet to be copied to any other position. Formulae may be automatically updated relative to their new positions.

Simple WORDWISE like cursor movement.

A unique windowing system enables any row or column to be fixed on screen, while allowing the sheet to scroll underneath. Simpler than other windowing systems yet more flexible.

While it integrates directly with INTER-WORD it can also transfer data to and from other word processors such as VIEW and WORDWISE.

A large range of standard maths functions is included in addition to special spreadsheet functions such as AVERAGE, COUNT, IF. . . ., LOOKUP, MAX, MIN, SUM etc.

Simple auto-prompting commands structure. If you can't remember the complete command syntax, just enter the first letter and INTER-SHEET will prompt from then on.

BBC ROM (2 chips) £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

All the above ROMs are fully compatible with DFS, ADFS, Econet, all BBC machine variants and Watford or Aries shadow RAM boards.

MEGA 3

MEGA 3—
the single chip solution

A new single 1 megabit chip containing complete versions of all the above programs is now available. This replaces 4 chips and so offers a more compact and more economic way of obtaining the above three programs.

BBC ROM £85+VAT (£97.75 incl.)
Archimedes ROM not yet available.

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On the road to DTP

Petra Galloway takes a look at the first word and graphics processor for the Archimedes

WHEN *The Micro User* first reviewed the Archimedes we described the Basic as boring – because in use it was just the same as the BBC B. I hope Clares won't be offended if I say that Graphic Writer would at first be boring for WordWise users for exactly the same reason.

Its packaging is the usual Clares black box with 58 page manual and Archimedes disc. The manual's introduction advises you to make an immediate working copy of the disc and explains the firm's unprotected disc policy – you are expected to be honest. After all why should you pay for software for other people to use? Besides, each program has a serial number.

To start up Graphic Writer insert the disc and press Shift+Break. The software takes about 20 seconds to boot, and it always loads a default file composed of two disc files called !DEFAULT (surprise) and BLANKDOC.

You can use them to hold your preferred ruler and margin settings plus perhaps your name and address for letters. On the main disc these two files consist of a sample text file – part of the manual – on which you can practice.

The options available on Graphic Writer are part keyboard driven and part mouse driven. The philosophy behind this is based on the fact that since Graphic Writer is a word processor, the functions required most often when typing can be accessed from the keyboard, but all the less-used operations appear on a pop-up menu. One omission was the lack of a function key strip for options that could be accessed from the keyboard.

On booting up you enter the text edit mode immediately. The keyboard controls are based on WordWise and – apart from the bright colours – you could be forgiven for thinking that you are using a combination of Interword and WordWise.

Apart from the controls the WordWise connection comes from the one way word-wrap – that is, if you type a long word at the end of the line it wraps around to the next. But if you shorten the word it doesn't move back to the previous line until you move the cursor up. However Graphic Writer uses rulers and sets up headers and footers just like Interword.

You can move around the text in two ways. First using the cursor keys in conjunction with Shift and Control, or using the mouse. You point to the place you want the cursor to move to and press Adjust. The text scrolls, but the mouse pointer doesn't. It's really annoying – because your eyes are fixed on the pointer and the text moves to the cursor not the other way round. So after the click you're looking at the wrong place. I just stuck to the cursor keys.

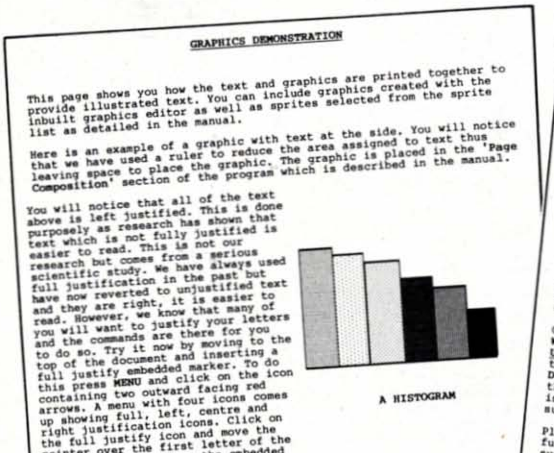
Text style printing is controlled by embedded commands displayed in the text as light blue highlights, which would probably give a good contrast on a monochrome screen. Each style is selected from the style icon on the word processor menu accessed by the mouses's Menu button.

One clever idea is the temporary text style – chosen by the Adjust button when pointing at the Style menu. This allows you to set a style – such as bold – at the start of the line and it is automatically cancelled at the end of the line.

So headlines and sub-headings can be set up in individual styles without turning your screen into a mass of embedded command highlights – although you can turn them off completely with Shift+f1.

Rulers are available with eight tab stops each and 32 are allowed per docu-

Turn to Page 71 ▶



GRAPHICS DEMONSTRATION

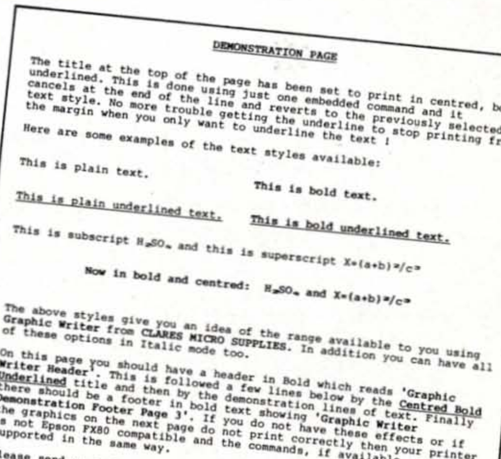
This page shows you how the text and graphics are printed together to
provide illustrated text. You can include graphics created with the
inbuilt graphics editor as well as sprites selected from the sprite
list as detailed in the manual.

Here is an example of a graphic with text at the side. You will notice
that we have used a ruler to reduce the area assigned to text thus
leaving space to place the graphic. The graphic is placed in the **'Page
Composition'** section of the program which is described in the manual.

You will notice that all of the text
above is left justified. This is done
purposely as research has shown that
text which is not fully justified is
easier to read. This is not our
research but comes from a serious
scientific study. We have always used
full justification in the past but
have now reverted to unjustified text
and they are right, it is easier to
read. However, we know that many of
you will want to justify your letters
and the commands are there for you
to do so. Try it now by moving to the
top of the document and inserting a
full justify embedded marker. To do
this press **MENU** and click on the icon
containing two outward facing red
arrows. A menu with four icons comes
up showing full, left, centre and
right justification icons. Click on
the full justify icon and move the
pointer over the first letter of the
first paragraph. Place the embedded
command here by pressing **SELECT**.

A HISTOGRAM

If you now preview the document by clicking on the **'EYE'** icon in the
menu you will see that the document is fully justified. To scroll th
page you can either use the cursor keys or the mouse. Holding down
SELECT or **MENU** whilst scrolling with the mouse increases the scroll
rate. The preview only shows one page at a time but you can move do
the document a page at a time by pressing the **‹PAGE DOWN›** key just
the cursors. To move up the document a page at a time press the
‹PAGE UP› key. Note the use of the 'bar' pad character between PAG
UP to avoid the words being split across a line break.



DEMONSTRATION PAGE

The title at the top of the page has been set to print in centred, bold
underlined. This is done using just one embedded command and it
cancels at the end of the line and reverts to the previously selected
text style. No more trouble getting the underline to stop printing from
the margin when you only want to underline the text !

Here are some examples of the text styles available:

This is plain text.

This is bold text.

This is plain underlined text. **This is bold underlined text.**

This is subscript H_2SO_4 and this is superscript $X=(a+b)^2/c^3$

Now in bold and centred: H_2SO_4 **and** $X=(a+b)^2/c^3$

The above styles give you an idea of the range available to you using
Graphic Writer from **CLARES MICRO SUPPLIES**. In addition you can have all
of these options in Italic mode too.

On this page you should have a header in Bold which reads **'Graphic
Writer Header'**. This is followed a few lines below by the **Centred Bold
Underlined** title and then by the demonstration lines of text. Finally
there should be a footer in bold text showing **'Graphic Writer
Demonstration Footer Page 3'**. If you do not have these effects or if
the graphics on the next page do not print correctly then your printer
is not Epson FX80 compatible and the commands, if available, are not
supported in the same way.

Please send us a photocopy of your printers command summary and the
full pages relating to the graphics options, particularly **ESC '*'** if
supported. Don't forget to quote your registration number and tell us
what printer you have. We will try to help but cannot make any
promises. **Graphic Writer** uses the Plotter Graphics mode of the **EPSON**
FX80 to produce the graphics in the correct proportions. If this mode
is not available then you must resign yourself to the fact that you
cannot produce graphics that are in proportion and as a result they
cannot match up exactly with the text as shown on the preview. This is
not a problem with **Graphic Writer** as we cannot make a printer do things
that it was not designed for.

Graphic Writer output containing text and graphics

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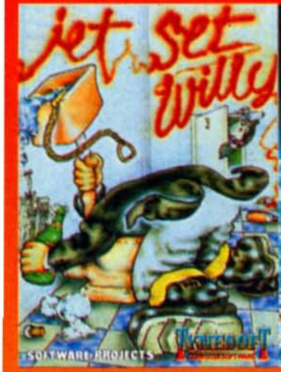

Jet Set Willy
SOFTWARE PROJECTS
TYNESOFT

BBC

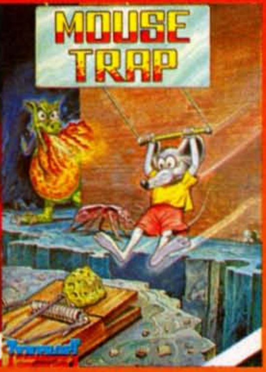
Jet Set Willy II

BBC & MASTER COMPACT

US DRAG RACING

BBC & MASTER COMPACT

BBC & MASTER COMPACT



BBC & MASTER COMPACT

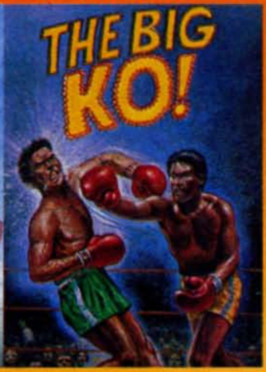
IAN BOTHAM'S TEST MATCH
TYNESOFT

BBC

FUTURE SHOCK

BBC & MASTER COMPACT

BBC & MASTER COMPACT



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TOTAL		

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◀ *From Page 69*

ment. There is a left margin and a return margin to ease paragraph indents. Rulers are deleted by clicking the Ruler icon with Adjust.

It was about here I began to lose track of the options. Frankly the choice of mouse buttons and clicks left a great deal to be desired – which icon is needed plus whether to press select or adjust became totally confusing.

There's a lot to be said for one or two button mice – I would have preferred more menus.

Up to this point there has been plenty of Writer and no Graphic. What makes this product special is that you can include pictures in the text. By clicking Menu twice you move to the main menu and have the option of shifting to menus for page composition, graphics, disc filing, page format, sprites, printer or previewing.

The graphics section allows you to create 16 screens of simple shapes and looks quite like Artisan. Each action you perform when drawing is remembered and can be redrawn when you come back to this graphic, but it also means that a scaling factor can be added to each operation so that the size can be changed.

Page composition is used to place the graphics in your pages. You should leave spaces within the text as you go along, perhaps adjusting margins to leave a gap to the right or left of the text. Each graphic is shown as a green box which can be positioned indiscriminately on the page – overlaying text if you wish.

A dark green box prevents the text underneath being printed, but by changing the box attributes you can make the text show through the box with the graphic image. By using a graphic which is just a yellow background, you are able to box a paragraph and shade it.

Sprites can be included in the picture as well, but cannot be scaled to size and must be printed as they are.

The disc filing window is the now standard Clares interface, but with additions to allow you to save pure Ascii files, load graphics and text separately – they are held in different files – and so on. There are further options to move around the ADFS file structure.

On a 310 you can have up to four documents in memory at one time and have them arranged to print together or load and save together. Shifting between them is achieved from the word processor menu.

I've left until last the most attractive feature of the system – the preview. What you get is a white paper image with all the typestyles set into the text, and the graphics included.

By pushing the mouse backwards and forwards you can scroll up and down the current page and the scrolling is unbelievably smooth. It's like holding a window over a sheet of paper and just moving it up and down – it really is quite a stunning effect.

Despite the unnecessarily complex options in the word processor I can highly recommend this excellent product as being *the* word processor for the Archimedes.

Product: Graphic Writer
Price: £29.95
Supplier: Clare's Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7OA
Tel: 0606 48511

LIGHTSPEED SOFTWARE

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BBC DISC

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ARCHIMEDES

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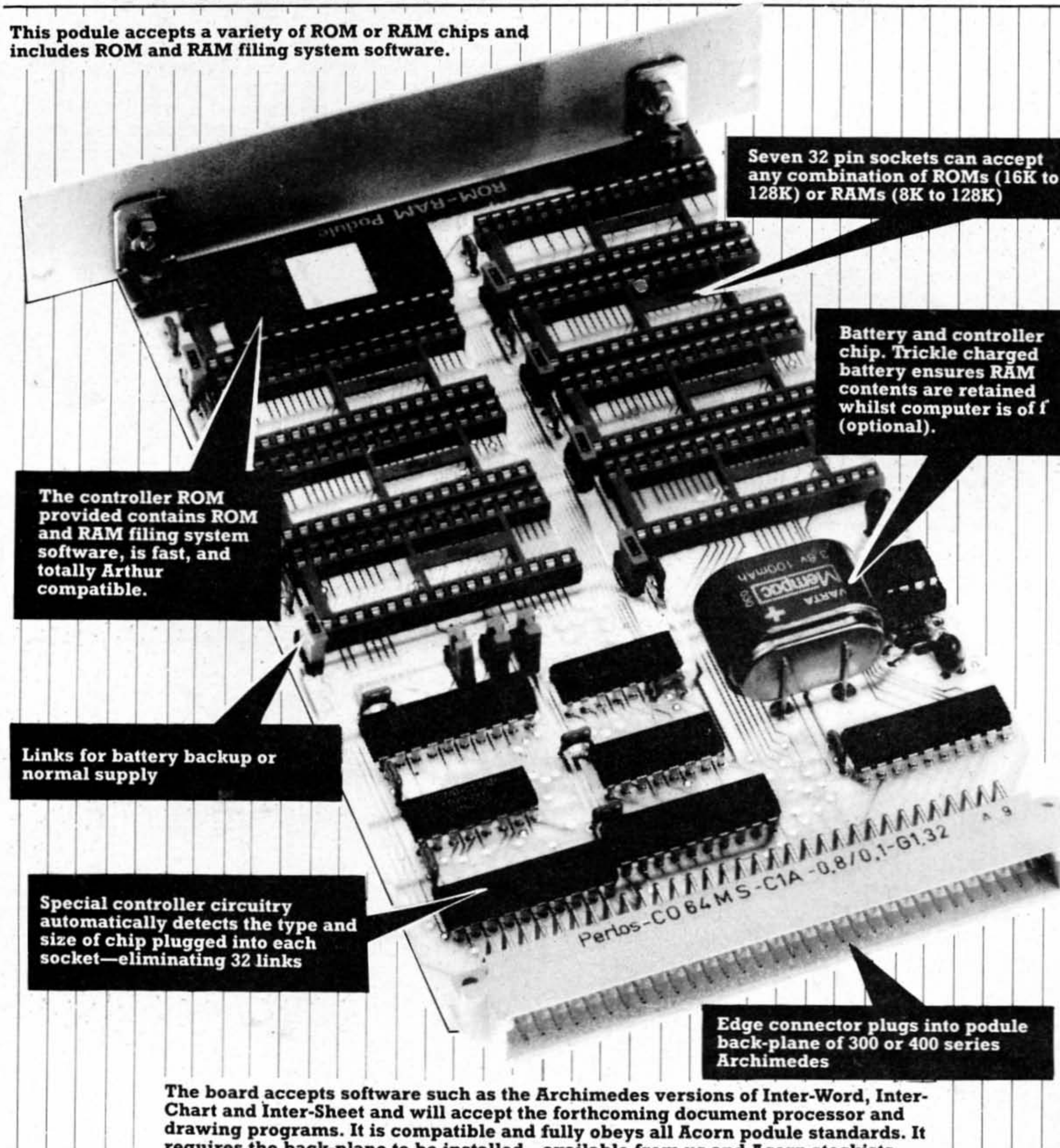
This podule accepts a variety of ROM or RAM chips and includes ROM and RAM filing system software.



Seven 32 pin sockets can accept any combination of ROMs (16K to 128K) or RAMs (8K to 128K)

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The controller ROM provided contains ROM and RAM filing system software, is fast, and totally Arthur compatible.

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Edge connector plugs into podule back-plane of 300 or 400 series Archimedes

The board accepts software such as the Archimedes versions of Inter-Word, Inter-Chart and Inter-Sheet and will accept the forthcoming document processor and drawing programs. It is compatible and fully obeys all Acorn podule standards. It requires the back-plane to be installed—available from us and Acorn stockists.

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Colourful catch 22

Steve Turnbull tries out a neat colour printer with a manual snag

IN the bad old days of teletypes – cranky mechanical mainframe terminals – some enterprising programmers produced pictures by printing different letters and symbols on to the paper.

When the dot matrix printer arrived pictures suddenly became much better – lots of small points allowing shading, grey tones and newspaper quality displays became possible. Laser printers are essentially dot matrix devices with a much higher resolution – but still only black and white.

Now you can add colour to your output very easily and quite cheaply with the Integrex Colourjet range. Most colour printers use multi-colour ribbons to produce the range – these are still dot matrix machines and so make a lot of noise.

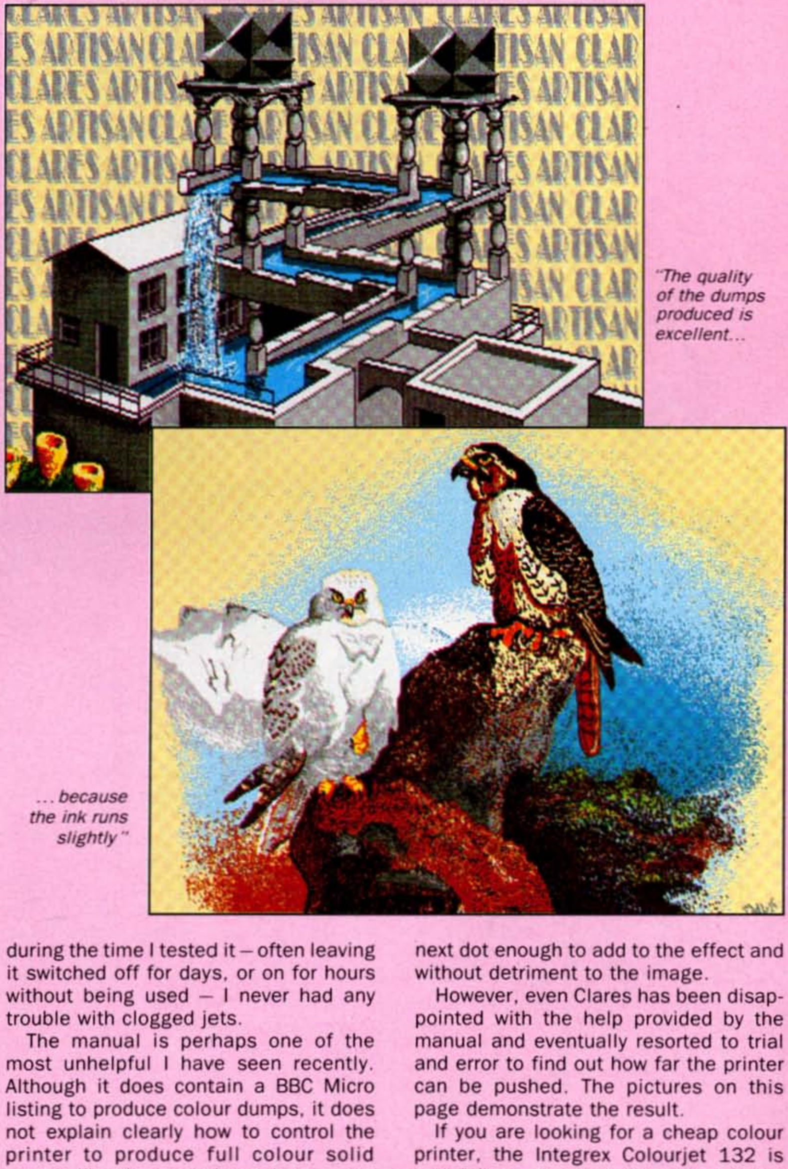
The Colourjet fires little spots of ink at the paper from one of its four reservoirs – blue, red, yellow and black – which gives a dot matrix effect without the noise. Impact printers use 8 or 24 pins so only one pass across the paper is needed to display a line of text. A jet printer can only print one line of dots at a time – in this case in colour – so is about eight times slower.

The standard Centronics parallel connector is used to link the printer to the BBC Micro, and once plugged in you can treat it exactly as you would any other. It's unlikely that you would buy one just to produce program listings, so let's look at things in colour.

One of the most noticeable things about the printer when you set it up is that the paper – which is supplied – is on a roll which fits into the machine under a hood. It has no sprocket holes and is friction fed.

The set-up instructions are fairly complex and you have to depress a lever while pressing a button: A similar procedure is used when packing. This is needed to prevent the openings through which the ink is fired from becoming clogged when the ink dries.

You are warned that leaving the printer off without protecting it against clogging can result in it not working. But during the time I tested it – often leaving it switched off for days, or on for hours without being used – I never had any trouble with clogged jets.



"The quality of the dumps produced is excellent...

... because the ink runs slightly"

The manual is perhaps one of the most unhelpful I have seen recently. Although it does contain a BBC Micro listing to produce colour dumps, it does not explain clearly how to control the printer to produce full colour solid dumps like the one shown here – not even an Epson manual-style list of what each control code does.

The main proponent of the Integrex printers at the moment is Clares Micro Supplies, providing a dump for its Artisan pictures – or any other Archimedes screen come to that. The quality of dumps produced is excellent because the ink runs slightly, merging with the next dot enough to add to the effect and without detriment to the image.

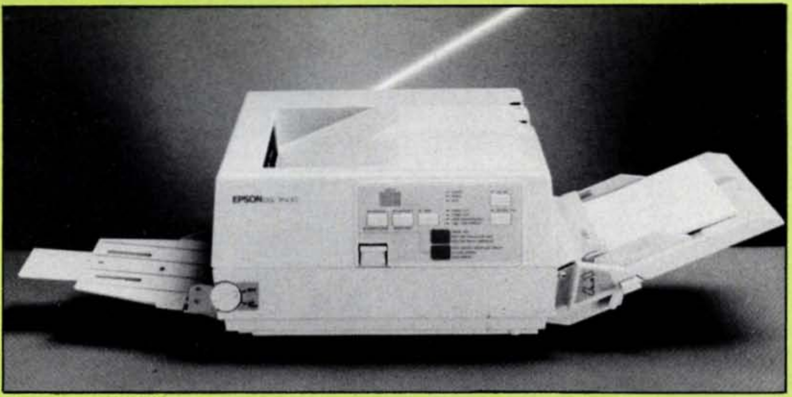
However, even Clares has been disappointed with the help provided by the manual and eventually resorted to trial and error to find out how far the printer can be pushed. The pictures on this page demonstrate the result.

If you are looking for a cheap colour printer, the Integrex Colourjet 132 is certainly worth a look. But with the very important caveat that if you want to do anything unusual or clever with it you will have a lot of hard work ahead of you.

Product: Colourjet 132
Price: £569
Supplier: Integrex Ltd, Church Gresley, Burton on Trent, Staffs, DE11 9PT.
Tel: 0283 215432

Bruce Smith investigates a comparatively low cost Epson-compatible laser printer for the BBC

Quality printing at a price


The Epson GQ3500

AS Epson tends to lead the way when it comes to printers – though that doesn't mean that they are necessarily the best – it's not surprising that they are one of the first to release a competitively priced laser printer aimed at the mass market – the GQ3500.

From the BBC Micro user's point of view the most significant thing about the GQ is that it is Epson compatible – Epson do produce non-Epson compatible printers, so that statement is not as daft as it might appear That said, quite amazingly it does not support the FX80 graphic modes so your standard printer dump programs simply won't work – though new ones can be written to resolve the problem.

Typical of all laser printers is it's weight – 16 kilograms – and a sturdy table is vital, though mine lives on the floor in the corner of the study. It's also significantly larger than a standard printer measuring 16 inches square and 9 inches deep.

However a further 20 inches must be added to the width to allow for paper feed and collection trays plus room for removing them. In fact it about doubles the area generally needed for a standard BBC Micro setup.

The great thing about standards is that by having them you always know what your doing, and so connecting the GQ to the BBC Micro presents no problems as it boosts a Centronics parallel interface. A serial option replacing the parallel one is available at a price.

Plugging it all together is straightforward. The toner cartridge which replaces the printer ribbon, clips into the centre of the machine after hinging the top of the case up.

Take very special care, as spilling the toner out of the cartridge makes you and the printer very, very messy as I have proved on several occasions. It helps to read the insertion instructions first.

If you do have an accident – a vacuum cleaner is the best thing to clean the printer out.

Toner installed, all that remains to be done is to insert two trays, one containing paper and the output tray, and the printer is ready for action.

Located on one side of the case is the SelecType panel from which you can select paper size, font, character set, number of copies and so on – in fact it provides you with a mechanical means of doing a VDU 1,27 sequence, and is particularly useful.

The opposite side of the case houses the printer interface board. Held in position by two thumb screws, it is easy to remove and hides a number of DIP switches where permanent setup details can be selected.

Once switched on, the printer goes through its pre-print checks. This takes about 15 seconds or so, which is reasonably quick for a laser printer.

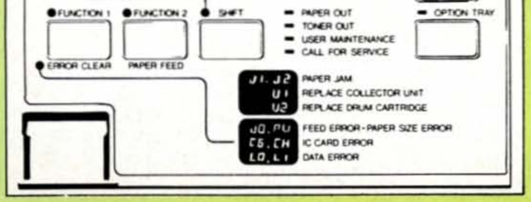
Font number	Font name	Pitch (cpi)	Point size
0	Courier 10N	10	10
1	Courier 10L	10	10
2	EDP 13N	13	7
3	EDP 13L	13	7
4	Modern PSN10	–	10
5	Ext-graphic 10N	10	12
6	Ext-graphic 10L	10	12

The various fonts available

The GQ has the seven internal fonts listed above. By default the printer starts in Courier 10 which is standard on most daisywheel printers. Three of the fonts are just variations on others – used for printing across rather than down the page – while one set is a graphics character font. Examples of some of them are shown on the facing page. The fonts also contain a variety of special and Greek characters assigned to normally unprintable Ascii characters.

The EDP font is quite a legible way of cramming lots of text on to a single page while keeping it readable.

Adding extra fonts is simple – you just plug in a font card which looks like a credit card and fits into a small slot on the top of the printer. A wide range is



The Epson GQ3500's main control panel

available but they cost £142 each. Once installed, a card gives access to the fonts used when the GQ is running in one of its emulation modes. Like the standard fonts, they have font numbers and can be selected using a simple control code sequence.

As well as plug-in fonts the Epson can hold up to eight downloadable fonts of 224 characters each. The 192k rom fitted in the printer understands a font definition control code sequence that enables you to design and download your own – though this is not a task for the faint-hearted.

Two emulation modes are possible – Hewlett Packard and Diablo. Using either requires an extra identity card which plugs into one of the two font card slots. There are 14 font cards for use in these modes.

Using the printer is no different from using any other. For example, in View you use PRINT or SHEETS and away it goes – the printer driver works correctly and all your normal effects are possible. Similarly, text from Mini Office II, InterWord, Wordwise and and any other application just gets printed.

However one point has to be born in mind: Being a page printer the GQ will not eject a sheet until it receives a form feed – Ascii 12. That said, the page can be hand-ejected using the control panel should it not be forthcoming.

Programming the printer is straightforward enough because of use of the Epson standard printer codes. For example the software code to select the EDP font is:

```
VDU 1,27,1,121,1,0,1,2
```

Broken down this translates as:

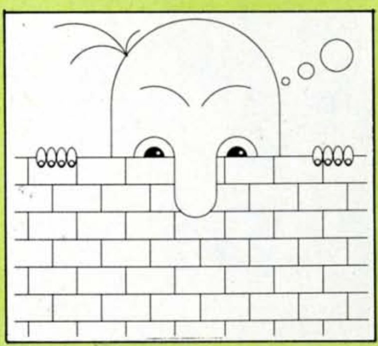
```
1,27 Send ESC
1,121 Sent font selection code
1,0 Select internal font
1,2 Select font 2 (EDP)
```

Despite not handling FX80 graphics, the printer has a good range of graphics with commands to dump bit-map images to draw lines, circles, arcs, fill and shade backgrounds, vary the printed page size and a whole host of facilities.

SHOPPING LIST

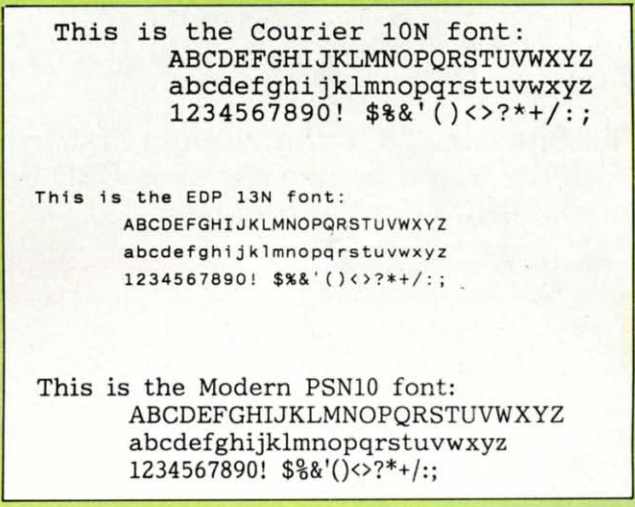
Epson GQ3500	£1953
1.5Mb ram upgrade	£506
Font cards	£142.75
Serial printer port	£109.25
Second cut sheet feeder	£511.75

All prices are RRP and include VAT



Demonstration image produced using an adaptation of a listing in the GQ3500 manual

Digitised pictured by its designer Mike Harris using the Watford Electronics' Image grabber on an Archimedes



This is the Courier 10N font:
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890! $%&'()<>?*+/:;

This is the EDP 13N font:
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890! $%&'()<>?*+/:;

This is the Modern PSN10 font:
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890! $%&'()<>?*+/:;

EDP, Courier and Ext-graphic fonts

These are fully described in the 286 page manual, which gives you some idea as to the full number of functions awaiting you.

A drawback when using these graphics facilities is that they require whole strings of numbers being sent to the printer. It's possible in Basic but difficult from within an application program such as View without completely reprogramming the printer driver.

One of the most useful features of the GQ is its form handling capability. Basically you can define a form – in Basic using a VDU1 command string, for example – and download it into the printer's memory. Once here you can send text in the normal way and print on to the form.

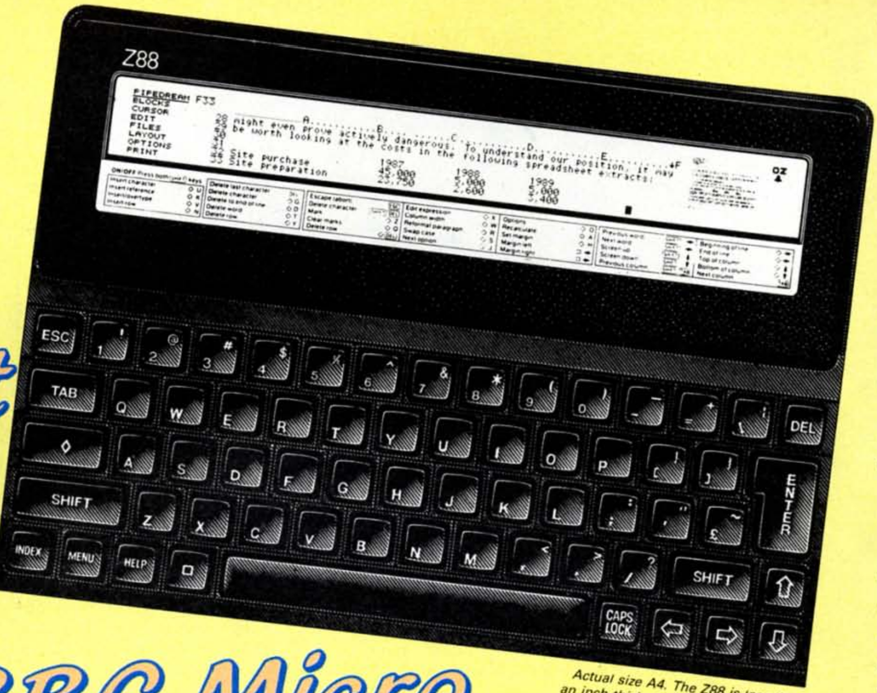
Epson offers a variety of extras including a second sheet feeder which sits under the printer and allows other types of paper to be used – headed stationery perhaps – under software control.

I have only touched on the surface of the capabilities of the GQ3500. The basic machine is only fitted with 640k of ram of which 170k is taken by the printer itself. My printer is fitted with a full 1.5Mb possible which I consider to be essential for anything other than printing text only.

The GQ performs well, and its range of facilities is wide, which combined with its form ability provides a means of generating your own stationery. However, it is very expensive and I would suggest that you consider very carefully before buying one. Make sure you see one in action first and bear in mind that laser printers are almost certain to come down in price over the next year.

Product: Epson GQ3500
Price: £1498.80+VAT (discount price)
Supplier: Datathorn, George House, 50 Spring Road, Laughten, Essex IG10 4QD
Tel: 01-508 4904

It's the latest – and the most exciting add-on for the BBC Micro



Actual size A4. The Z88 is less than an inch thick and weighs under 2lbs!

The Sinclair Z88 is the world's first truly portable, truly full-facility computer. And because it uses BBC Basic it is the ideal companion for the BBC Micro and Master.

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Because it weighs less than a bag of sugar, it's an ideal travelling companion. Word-process your letters, memos or reports while on the move – then when you're back home or in the office transfer your files to your BBC Micro – it's done in seconds!

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The Z88 doesn't need bulky disc drives. Memory is stored in solid-state interchangeable packs measuring 2½in square. Extra ram and eprom packs are available from suppliers such as Watford Electronics.

SPECIAL OFFER!

Exclusive to readers of *The Micro User* – the Z88 comes complete with a disc of games and utilities you can transfer direct from your BBC Micro with the FREE lead supplied.

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- Detailed 218-page manual.

```
The Micro User Z88/BBC Micro transfer
File saved on disc as MEMO .
Load into word processor (Y/N)? Y
1 .. MINI OFFICE II
2 .. WORDWISE PLUS
3 .. WORDWISE
4 .. VIEW
5 .. INTERWORD
Press a number_
```

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MU4

Mike Cook helps you pick up the gauntlet to solve a devious programming problem

It's a challenge!

HINTS AND ALGORITHMS

IN our March issue we set out a programming challenge to test a roulette gambling method. The strategy was always to bet on the red numbers and if you lost, to double the bet until you won.

This month we present you with a plain English description of how to translate the betting strategy into a program. You can refer to the March issue to compare the techniques here with the original problem.

In the next edition of *The Micro User* we will give you a no-frills program that will do the job, along with suggestions for further improvement. You can check this against your own efforts and perhaps sort out any points you had difficulty with.

Remember, as far as a program is concerned there are as many right answers as there are wrong ones, but the solutions I favour are simple and readable.

I will avoid, as much as possible, using fancy tricks or so-called clever programming techniques, as most of the time they are not necessary.

So, without further ado, I present the hints for the casino problem...

THERE are many ways of writing a program: One method is called *top down* programming, where you plan the outermost level of your code first and work down, sub-dividing the problem until you reach the nitty-gritty.

I prefer to write the crux routine first and build the rest of the program around it. This is usually known as *bottom up* programming although I call it *middle out*, as the first routine you write ends up in the middle of the code and you put all the fancy extras around it. Let's see how we can program this problem using the bottom up method.

There are 37 positions on the roulette wheel, ranging from 0 to 36, so the first thing we have to do is to produce a number in that range. The random number function RND(N) will generate a number between 1 and *N*, where *N* is the number in the brackets. So to get our roulette value we get a number between 1 and 37 and subtract one.

Having spun the wheel we need to see if the number generated is a red number, in other words have we won? The red numbers are:

```
15,4,2,17,6,13
11,8,10,24,33,20
31,22,29,28,35,26
```

We could test these against our random value from each spin with a separate IF statement but this would take 18 lines.

```
IF roll=15 THEN
IF roll=4 THEN
IF roll=2 THEN
...
```

There is a rule in computing that when you find yourself writing nearly identical lines of code, there is an easier way to do it.

In this case the answer is to use an array to hold the red number data, so that we need only have one IF statement inside a loop.

Before we enter the loop we must set a variable – *WIN* would be a good name – to false. Then if one of our array values matches the spin we change its value to true.

However, we need to initialise the array at the start of the program by reading the red numbers from a data statement.

Having found out whether we have won, appropriate action can be taken – either add twice the bet money to our pot if we have won, or double the bet if we have not. At this point we need to test if we have the amount to cover the bet in our pot – if not we are broke and the run ends. Otherwise we subtract our bet from the pot and try again.

We should also keep track of how many bets we have placed. That should be easy, simply increment a counter every time – and look for some criteria for when to stop, other than losing all our money.

For example, we could stop when we have doubled our initial pot, or when a certain number of bets have been laid. It would also be useful to keep track of the largest bet we have had to place.

Finally to stop the program looking boring when it's running, after each bet let's print its value and what's in the pot as well as the bet number every spin of the wheel.

● *Well, what are you waiting for? Get tapping away at that micro and I'll see you next month with a solution.*

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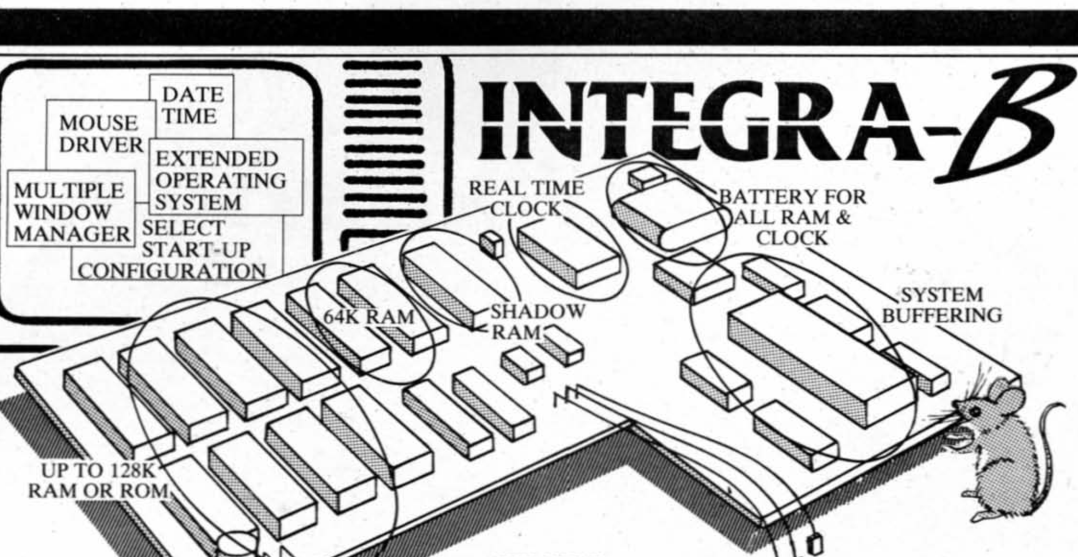

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EDUCATION UPDATE

Acorn invests in software

ACORN is to put £250,000 into a pump-priming exercise to speed educational software on to the market.

It will provide funding and support to firms and education authorities that are developing software for the Archimedes.

Acorn is also organising three educational software conferences where leading educationists will define and propose applications needed to support new and existing areas of the curriculum.

The company is also collaborating directly wih individual LEAs.

One of them is Derbyshire where a joint project is establishing an Archimedes software database that can be accessed by the county's schools through The Times Network for Schools.

Acorn's product manager David Bell said: "Our investment should enable more firms – especially the smaller ones where some of the most innovative applications are being written – to progress with development faster than would otherwise be possible.

"More than 500 developers are working on software for the Archimedes and demonstrating how this powerful technology can be exploited. We're looking forward to seeing similar high quality packages arrive in the classroom".

Electronic music rolls in

PIONEER in using computers for music education, Bedfordshire Education Authority has refitted a 52 seat coach as a music studio and sent it off to tour schools in the county.

Passenger seats have been replaced by eight purpose-built workstations, and in the rear is a master station.

Five of the stations are equipped with computers – four BBC Master-based Hybrid Music Systems and one Yamaha CX5M – and three have synthesisers.

The master station provides more electronic instruments and the main recording facility. All stations have Hybrid Music 1000 amplifiers for mixing and monitoring, each sending a stereo signal to the mixing desk.

Pupils work one or two at each station, listening on headphones. A third outlet lets the teacher join in, and the master station provides remote monitoring. Youngsters record rough versions of work on portable cassette recorders, and use the link to the master station to record their final results.

The Music Bus is designed to complement rather than replace the normal school music lessons. Many schools have computers and synthesisers in their music room, but the Music Bus gives pupils more time to work on their own projects and provides better facilities for final recording.

I-APL interpreter

THE first all-machine, truly portable computer language – I-APL – is nearing completion, says the project's European chairman. It will mean a program written and tested on a BBC Micro can be loaded and will run on everything from Apples to Spectrums, IBM PCs and clones, CP/M machines and many others.

The I-APL project was started two years ago to write and issue a free international APL interpreter for home and school micros. Its supporters believe APL is a notation which should be widely used in education, in particular because of its value in maths learning.

European chairman Tony Comacho (0727 60130) said: "The annals of shoe-horning will never be the same again – I-APL is running in less than 26,000 bytes of code in a BBC Master. The smallest previous complete APL interpreter was over 75,000 bytes and typical mainframe APLs are over 400,000 bytes".

On the BBC Micro I-APL goes into two eproms and in Mode 6 gives 13k of workspace. In a Master there is nearly 30k.

Comacho says I-APL software will be free – the only charge being for the disc, copying, books and manuals.

Educational news at speed

THE power of today's micros in education – notably the Archimedes – is the subject of a new 30 minute video produced by the BBC in conjunction with Acorn Computers. Aimed at teachers and local authority advisers. Micro News shows how teachers and pupils in Birmingham and Lincolnshire schools are using computers in sophisticated way to learn and practise a wide range of skills.

The film highlights the revolution in teaching brought about by classroom micros, in particular how an advanced system like the Archimedes with its sophisticated colour graphics and sound can contribute to exciting learning and teaching.

It also demonstrates how commercial software such as spreadsheets can be used effectively to teach useful business skills.

At one school featured in the film, pupils use Archimedes systems to produce – in a single day – a newspaper complete with graphics after

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◀ *From Page 79*

only a few lessons on the machines.

The project involved the children in business decision making using information from financial spreadsheets, tested their word processing skills and even used their artistic abilities – from choosing typefaces held on the Archimedes system to computer-designed advertisements.

Pupils in primary schools are also shown using the Archimedes to create new sounds, and composing music on-screen by traditional notation.

Interface for Lego buggy

AN interface allowing a Lego Buggy kit to be controlled by a BBC Micro has been released by the Yorkshire and Humberside LEA consortium Resource.

The simple piece of electronic circuitry sits on top of the Buggy with a sensor board monitor in front. It comes with three discs of control software suitable for different levels of use, and a lead connecting to the user port.

Resource (0302 63800) is selling the interface and software for £41.95, with Lego kit £64.95.

New releases

FIRST of this year's educational releases from BBC Software are Geordie Racer and Bird Spy. Colourful graphics test lateral thinking and memory in Geordie Racer, an absorbing detective game based on the BBC School TV series Look and Read. Price £14.95.

Bird Spy is a specialist database program on which sightings of birds can be recorded, displayed and analysed – but it can also be adapted for all survey work. Price £14.95.

Other titles from BBC Software this year will include Geology, Help Yourself Maths, and a game called Hall of Mirrors based on the radio series First Steps in Drama.

Support for merger plan

THE chairman of the management board of the Microelectronics Education Support Unit has welcomed the idea of its amalgamation with the Council for Education Technology.

Commenting on Education Secretary Kenneth Baker's merger proposal, Mike Nichol said: "I cannot pre-empt the decision of the MESU management board, but speaking for myself I welcome the general thrust of the proposals.

"MESU has sometimes been constrained in its actions by being largely limited to a single technology and the Secretary of State's proposals will provide a wider remit.

"I hope the new body will build on the strengths of both units and especially the strategy built up by MESU of taking the advice of the initial teacher training institutions and the LEAs in developing its brief".

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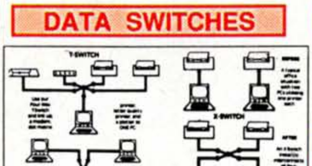

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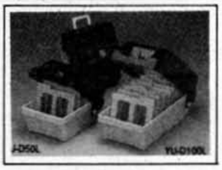

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CEEFAX Guide

Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues *are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.*

March 4 to 10

T/OSB16
B/OSB16
Osbits is a 26 part course to help you understand the BBC Micro assembler language. Module 16 studies how binary division is carried out and explains the algorithm used in the program B/OSB16 to achieve this.

TTXPrnt
PrntSrc
The ATS teletext software has a facility for a variety of different print routines to be used to print out any Ceefax pages. TTXPrnt is a routine to send the text part of any teletext page displayed on your screen to a printer simply by pressing Shift+f9. The source code can be modified to make use of rom based printer dump routines if required.

Kermit
Kermit is a versatile and widely used communications protocol allowing any two types of computer – micros, minis, mainframes or any combination – to transfer files from one to another with the minimum of fuss. Both machines must be running their own version of Kermit for the transfer to be effective. This version is for use on any BBC Micro, and is accompanied by a very comprehensive User Guide.

Doomrun
A totally absorbing high-speed space action game from the July 1984 issue of *The Micro User*.

March 11 to 17

T/OSB17
B/OSB17
The Osbits course continues with a study of Events and shows how they are trapped using the Event Vector. Each module of this guide consists of a text file, suitable for direct display on the screen in an 80 column screen mode or for loading into a word processor, and a Basic program, written largely in Assembler language, to demonstrate the points made in the text. Each text file carries the prefix T and each Basic file starts with B.

T/SWR19
BootRFS
RFSgen
Demo
Resuming broadcast of the series explaining how to make use of sideways ram – fitted as standard on all B+ and Master computers, and as an optional extra on any Model B – T/SWR19 begins a study of using the RFS rom filing system. This allows any data files, Basic or other programs to be stored in sideways ram, making them readily available for use at any time. The RFS is a standard feature of any BBC Micro. If sideways ram is not available on your machine, the routines can be used to program an eprom – if you can persuade someone to lend you an eprom programmer – to ensure your programs are permanently available within your micro.

Snap
MoveUp
T/Use
The SAVE command will save any Basic program, but not the variable settings or any other data the program has set up. Even a *SAVE cannot save the entire memory contents without some corruption as the disc filing system alters some areas of memory during the saving process. The answer to this problem requires some very ingenious routines previously only available on mainframe computers. Snap will, at the touch of a button, save the entire contents of memory to disc.

OilRig
OilRig2
An intriguing game involving the siting and operation of North Sea oil rigs. As leader of the well exploration team, can you find the most lucrative site for your company's rig constructions? Use your judgement to find the best time to sell it to another company, or fight off the offers made by your rivals. This game is very entertaining, and is sufficiently realistic to be of value in educational situations.

M–Organ
This utility from the August 1985 issue of *The Micro User* – Mouse Organ – lets you conduct your performances with a mouse.

March 18 to 24

T/OSB18
B/OSB18
This week's Osbits module discusses interrupts and how to process them, demonstrating the process with a routine to detect the movement of a mouse connected to the user port.

T/SWR20
RFSgen
RFSERV
Demo
The sideways ram programmers course continues its study of the rom filing system – RFS – for storing data, programs or other types of files in either sideways ram or plug-in roms. On a Master computer several roms containing your own software can be plugged into a cartridge for use in the rom cartridge slots. On other BBC Micros they can be plugged into the main circuit board. In either case your programs will be instantly available for use without the need to load them from disc or tape.

Astro
AstInf
For amateur astronomists and others interested in the heavenly bodies, this routine will convert between equatorial and galactic coordinates using three of the more common methods of mapping the heavens.

Scope
Datascope is a suite of six programs to turn your micro into a real time digital storage oscilloscope, monitoring signals applied to the A to D port. A two part comprehensive instruction file is included giving application examples, circuit details and so on. Several example data files will be broadcast in the coming weeks.

Castle
This program Castle of Fear is an intriguing adventure game guaranteed to keep you enthralled for hours. It was first published in *The Micro User*.

March 25 to 31

T/OSB19
B/OSB19
Osbits part 19 continues the study of interrupts with a look at the timers contained in the system and user vias.

T/SWR21
RFSGen
RFSLang
Demo
More details about the BBC Micro's rom filing system from the sideways ram series for programmers.

Hlp/Inf
FXData
FXHelp
Help
How often have you been in the position where you can remember a particular facility exists but can't quite remember its exact syntax or how to use it? Help will solve this problem for you by making a variety of selected information permanently available from the keyboard. Hlp/Inf shows how to create your own sideways ram or rom image using your own information. By typing your chosen keyword after a *HELP command, the details you require will be printed on the screen – saving hours of repeated fumbling through manuals.

Scopedata
Example data files to accompany last week's DataScope software.

Villains
Can you preserve the lidthium crystals from the attack of Hugo and his assassins in this game from the September 1984 issue of *The Micro User*.

PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II now also available for ARCHIMEDES

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

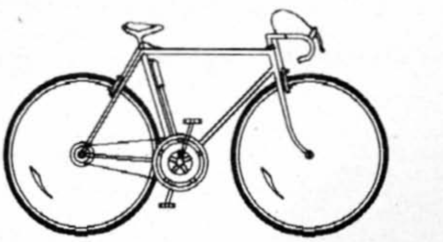
For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



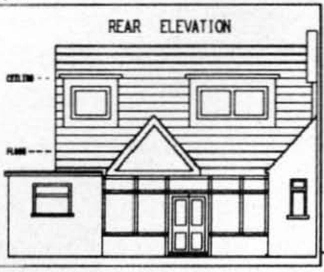


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.
ARCHIMEDES version on 800k 3.5" disc.

DIAGRAM II — £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

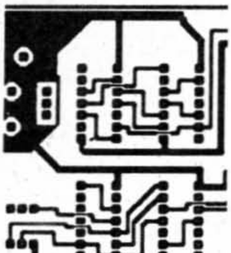
Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + VAT

Plotter Driver to suit most plotters £ 35.00 + vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A connection list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest!

You may specify which side of a board you wish the track to be on or leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins. Tracks may still be drawn manually at any time so boards may be produced by a combination of manual and auto techniques if required.

The program is in the form of a second Eprom and all the features are available even with an unexpanded model 'B' computer.

Please write or 'phone for full details.

COMPLETE AUTOROUTE PACKAGE (including manual eprom) £ 185.00 + VAT

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	£ 60.00 + vat
For Master 128 (with Pointer Rom)	£ 60.00 + vat
Bare Trackerball (no software)	£ 49.00 + vat
Pointer Rom - available separately	£ 12.50 + vat
Trackerball to mouse adapters	£ 8.00 + vat
Postage & packing on Trackerballs	£ 1.75

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors. As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT, *WIPE

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Access

The micro's future in schools

Marshal Anderson takes a look at the shape of things to come

WE hear and read a lot about the speed of change in the computer industry and are presented with possibilities that make our collective heads spin. As teachers – and guardians of scarce resources – we must take a long, hard look at the futures available.

Some of these prospects promise to alter completely the way we look at education, and it would be prudent to get right what we are doing now before we hurtle off into some Brave New World.

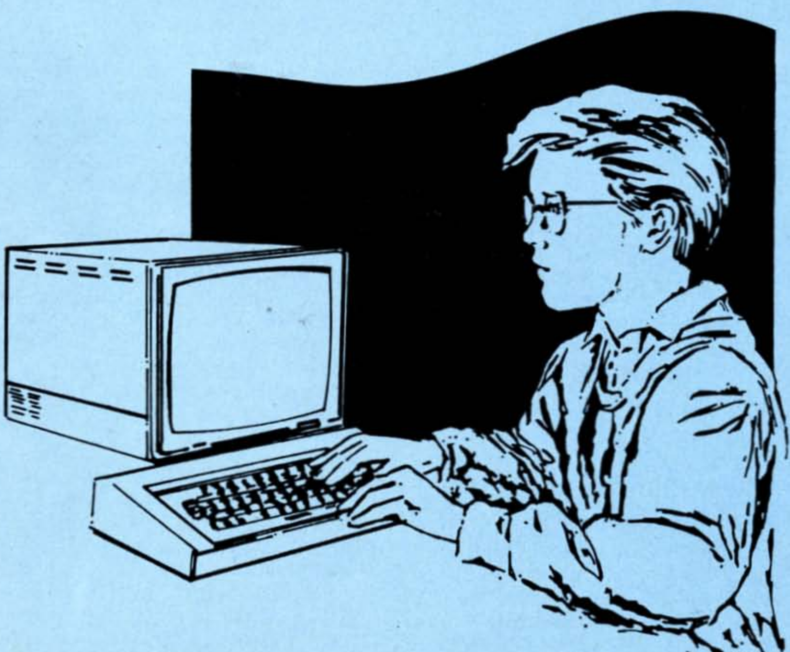
Some of the options bring to mind the old joke: If you want to get *there* you shouldn't have started from *here*. But where is here?

We must accept that micro-based education is not universal in primary schools today. Many machines still spend much of their time in cupboards, while others are used aimlessly, out of the notion that *we ought to do something with them*.

So, the first task in developing computer education must be getting these scarce resources used – a job that is expensive, time consuming and requires more than a little commitment from those who hold the purse strings.

And if this offends you because you work in a county that provides excellent support, you only point to another problem – national inconsistencies.

Not that we necessarily need a centralised curriculum, but that central funding for INSET would greatly improve the use of current resources before we start planning for more. Neither does it mean that we don't need some sort of cutting edge examining new developments – but that it should be better organised and not left to individual schools.



Given the desperate need for rationalisation, what technical developments might we expect to see entering junior schools in the next few years?

Under a constant inundation of new micros we may be forgiven for thinking that soon they will be infinitely capacious, unimaginably fast and, most importantly, ridiculously cheap.

On the first two points we might be right to a degree – the Archimedes goes a long way to achieving this. The price, however, is not low by junior school standards – even with education discounts.

There are big problems with this sort of development – the main one being the sheer cost of replacing existing machines: Even £500 would stretch the most ardent PTA to its fund-raising limit. To make any changes cost effective they would have to be national, not local. This is the only way to bring the software houses to us – for come they must.

Software costs

And following from that: In upgrading their system no school will want to write off all its existing software. Apart from the cost, again it would require a substantial re-thinking of its approach to micro-based education as the teachers come to terms with the new programs.

The upshot is that any company developing a new micro must make it fairly compatible with its predecessors. Thankfully Acorn has achieved this very well and the vicious circle has not set in – few people will buy a machine while there is little software available and software houses won't release software until the user base is big enough to return a profit.

But we might ask whether there is any need to upgrade hardware at all? While it is true that any micro is almost instantly out of date in view of continuing

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◀ From Page 85

developments, the software will always lag behind.

It is self-evident that the BBC B, though still the same piece of hardware as six years ago, is a totally different animal in terms of software. Compare the early MEP packages with those available now, or word processors like Beeline with Folio.

And what about the peripherals? First there are the necessities – disc drives, monitors and printers. The drives seem to have hit their lowest price level and, being largely mechanical devices, are unlikely to go much lower.

Other developments in this area are of interest – especially hard discs. But while they have many advantages they are still expensive and must be included in a network to make economic sense. Currently the break point that makes a network cheaper is reckoned to be 25 stations for the Master. But what about the cost of converting the system – new chips and redundant drives?

Breakthrough

Monitors are likely to go the other way, because with the introduction of higher resolution graphics more sophisticated ones are needed. Printers, on the other hand, are falling in price though they may not fall much further.

The big breakthrough here is the vague industry-standard based on the Epson machines and, once more, software writers seem to be able to squeeze more and more out of them – as in Typesetter! We might also hope to see the cost of laser printers drop to an affordable level. But even if they do, do we really need them?

Looking beyond the core of the system we find ourselves on shaky ground.

For input, the keyboard will be with us for a long time to come – if only because it is cheap and efficient. Other methods have been tried but few have caught on.

A good example of this is the Microwriter, an expensive device that required a whole new set of skills before the child could even think of communicating with the machine.

To a lesser extent is the under-achievement of the Concept keyboard, not because it is a bad idea, but because there aren't enough about to encourage software publishers to exploit them.

The same goes for the lightpen, touch-sensitive screens and mouse. All require specialist hardware and software which tend to be incompatible with each other and still only marginally improve what a keyboard can do.

In terms of output we're on safer ground when anticipating developments. Cheap colour printers are here, and when they can compete in speed and quality the switchover will be natural.

Speech output is already with us, and it is interesting that the cheapest and most flexible system is a software development and not hardware-based. As ram space gets larger this seems the most likely alternative to the screen.

Video's potential

The most exciting up-and-coming peripheral is IV – interactive video. We were all very impressed with the Domesday Project but even with this development, with such obvious potential, there are grounds for caution. Certainly the cost of the machines will come down – even down to where primary schools might be able to buy one. The problem comes in the production of software.

Unlike most software produced by freelancers operating through publishers, IV requires a massive investment of time and money. You cannot just try out a good idea, run up a few copies and see how they go down in your local school. Initial funding must be from a basis of uncertain commercial returns.

A recent development has been in communications, and has had central support in the form of the DTI modem hand-out. In what way do junior schools expect to use this equipment? In many counties a modem is all that's been issued,and the high running costs in terms of phone bills and service charges left to the school.

While access to large databases such as Neris – the school's database set up by the Open University – is an advantage, just how useful is the ability for a school to communicate from one end of the country to the other – when more personal messages can be sent cheaper by the Post Office and BT?

To teach computer literacy we don't need powerful state-of-the-art technology – we need reliable, well supported machines that are easy to use and abundant. We cannot hope to give children a micro-supported and micro-based education when there is only one machine to every 120 pupils – Kenneth Baker's own figure.

Enough machines

So, let's crystal gaze at what we might reasonably ask for and hope to get. Ten years hence we might see a computer not far removed from the Master 128, with software that exploits its full capacity at a price we can afford.

There will be agreement on what is good software, and schools will be able to buy it in confidence. The operation of these machines and their software will be so straightforward that teachers will be able to load-and-go without reading manuals and constant reference to one member of staff.

The most important factor will be enough machines for children to use as and when they need – at least two machines per classroom, probably networked to a hard disc and sharing several printers.

There will be a modem connecting all the machines to local or national databases with no user charge. And we might also see some specialised equipment more thinly spread.

With such a set-up in all schools we could then expect to see the micro affect the education of all primary school children. Until then let us build carefully on what we've got for the good of all rather than producing a few high tech centres of excellence.

As Sir Frances Bacon: said, "Money is like muck, not good except it be spread".

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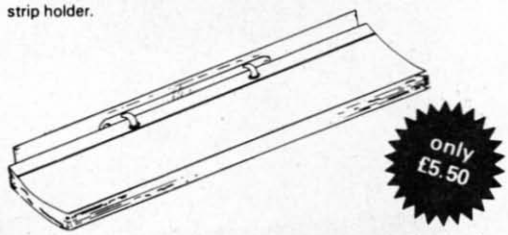

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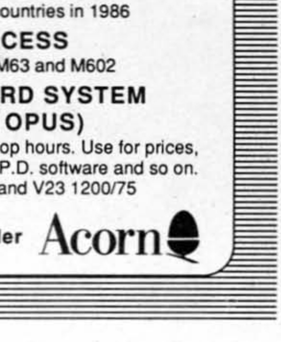

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5. Why do Midi systems use a serial form of data transmission?

ENTRY FORM

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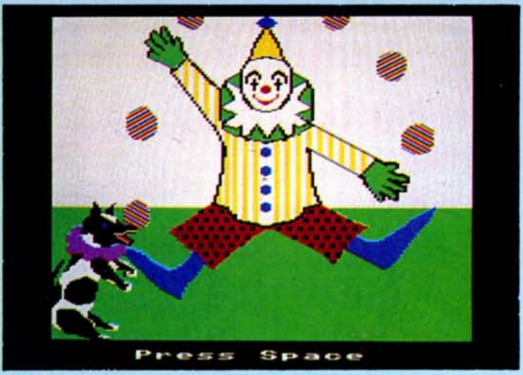
4.88(4)

Product: Window
Price: £4.50
Supplier: MESU, Unit 6, Sir William Lyons Road, Science Park, University of Warwick, Coventry CY4 7EZ.
Tel: 0203 416994

Windows on reasoning



Building the clown

WHILE teaching children that two and two make five may not make for a sound education in maths, we often want them to do just that – at least as far as reasoning and hypothesis forming skills are concerned, that is.

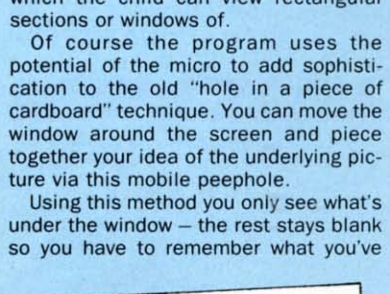
The point is that the ability to make inferences from limited data is a valuable ability that can be hard to teach, particularly to children with learning difficulties.

Window, from Warwick University's Microelectronics Education Support Unit (MESU) is designed to remedy this. The idea predates the advent of the micro in the classroom: You show a child portions of a picture and, by careful use of language, draw out inferences as to the whole.

In essence this is what Window does: It consists of a library of screen pictures which the child can view rectangular sections or windows of.

Of course the program uses the potential of the micro to add sophistication to the old "hole in a piece of cardboard" technique. You can move the window around the screen and piece together your idea of the underlying picture via this mobile peephole.

Using this method you only see what's under the window – the rest stays blank so you have to remember what you've covered or go back to it. This is known as *moving*.



Alternatively you can *build* the picture: Here whatever you've exposed via your window stays on screen, so gradually the whole builds up.

Where the micro scores over the old non-digital technique is in its ability to sequence the previous two operations. Instead of moving your window where you like, you open up a pre-arranged sequence of windows that can vary in size. This way a teacher can structure the order and scope of visual clues. That's the theory: So how does it work in practice?

Well, it's remarkably easy to use. Disc based, it's really a basic set of "runtime" routines plus an example picture library. Avoiding the question of start-up configurations for the moment, you can boot up and go straight through to a quick menu – probably all the student needs to see. Its options are:

- *Use some pages*
- *Choose new pages*
- *Change the method*
- *Change the input device*
- *Go to the full menu*

Throughout, picking options is simple: Press the spacebar to move a highlight cursor through the menu and Return to select.

With the quick menu you select the set of pages or screens you want to work on via **Choose new pages**. You pick screens from the disc "blind" – by referencing them as A, B, C and so on. At first this seems rather unfriendly in an otherwise easy-to-use product, but of course supplying the titles would rather give the game away. Fortunately the teacher can see what's what by pressing Control+R to reveal the titles.

Change the method refers to the way the picture is built up: Leaving what's revealed on screen (building as opposed to just moving), using a predefined sequence of windows and so on.

The program supports a variety of input devices: Single or double switches from the analogue or user port, Concept Keyboard, roller balls, light pens, joysticks – thirteen options altogether, plus the keyboard. And you can also dump screens to several types of printers.

The start-up conditions are quite comprehensive, determining the printer type, key repeat/delay, disc drives, method of input and the amount the screen moves for each press.

Window comes on three stand-alone discs, with over twenty well-chosen example screens. The detailed manual takes you carefully through setting it up – making backups, configuring for two drives and so on.

It also has a very valuable chapter on

how to use the pictures – divided into collections, complex objects, scenes, groups and text – with relevant extra related activities plus interesting teacher comments. This product has seen plenty of classroom use!

You aren't restricted to the screens provided, though, as a glance at the full menu shows you. You can copy or delete pages and even make turnkey Window discs for your own pictures. These pictures can be any simple – that is, unpacked – screen save.

It's at this stage that some of the operational drawbacks to the way Window has been programmed begin to show. To get as many screens as possible on the disc, it uses its own method of packing. While laudable, the effect is to make the whole program lamentably slow as it reads new pictures from disc.

Worse still, if you press Break or have a power-down while it's unpacking, your disc becomes garbage.

There are other restrictions as well: You're stuck with Modes 1,2,4,5 and 7 – though the latter is converted to an odd-looking Mode 4 before saving – and Mode 1 screens can only use two colours. Also the bottom three lines are reserved for instructions. One nice feature is that you can change the windowing on existing screens and create it on those you're adding.

Size is easily varied by means of a rubber rectangle, while you can also sequence the windows as you wish – overlapping or separate, varied areas and so on up to 32 windows.

Editing this information into a new screen is straightforward – and careful structuring at this stage is vital to the educational value of the program.

Incidentally, while creating my own disc I came across a problem that might cause others difficulty: I couldn't get rid of the original library despite the clear option to do so. Nor could I delete individual pages.

In the end this boiled down to a rom clash: Throughout the programmers have used abbreviations for star commands – in this case *A. for *ACCESS which caused havoc in my heavily populated rom board.

There are other niggles, too. For instance not all the input devices work on menu selection. And it would be nice to be able to customise a disc via macros so that the method of display was chosen from the start. An automatic step-through timed mode would have been useful, too.

However, the main drawback is one highlighted by the question that goes right back to the first days of educational computing – can't this be done as well or better away from the computer?

And the fact is that most of it can.... Alright, you can't use the micro's sequencing abilities but it is easier to build up a library of far higher-resolution screens to work on. (They're called photographs.)

Also, the whole educational value of Window lies in its stimulation of pupils' thought processes. On its own it won't do this – it's up to the teacher to encourage inferential skills by intelligent questioning and careful use of language.

With these provisos, though, Window provides quite a useful resource – particularly for the handicapped. While somewhat slow and occasionally inelegantly programmed it's very user friendly and is undoubtedly terrific value for money.

My recommendation? Take a look: At this price it's got a lot to offer.

Mike Bibby

A different concept

Product: The Toucan Learning Tray
Price: £425.00
Supplier: Toucan Comminication Aids, Unit 21, Third Avenue, Crewe Industrial Estate, Crewe CW1 1XU.
Tel: 0270 588039

THE Toucan Learning Tray is designed for the physically handicapped along the lines of the Concept Keyboard. However, my initial reaction was dismay at the lack of instructions accompanying it. I think the producers assumed that each school would have the prior knowledge needed to set it up.

Granted the procedure is not difficult, but in many schools additional diagrams and talk-through would be appreciated. The technical installation instructions were rather unclear and it was very easy to make wrong connections – resulting in the tray refusing to work.

However, the customer support given from Toucan is excellent and they are only too pleased to talk you through any problems you may have.

So what is special about this from the now familiar and popular Concept Keyboard? The Learning Tray, though similar, is fundamentally different. It works on the principle of light scanning the area with a switch (or two switches) to choose the exact point on the overlay.

Instead of touching the point you want, the keyboard is illuminated by rows of lights. Hitting a switch at the time a row is lit chooses that row. The light then scans down the row from top to bottom – hitting another switch chooses that one small area. A second switch finally accepts the choice.

It was principally designed for handicapped children unable to reach out and touch and as such it has a number of fail-safe ideas built in.

As it is very difficult to categorise children, the switches can also be adapted easily. For instance, for children unable to use their hands there is a blowing switch, or one operated by rocking or turning the head.

There are a lot of nice little touches which impressed me, such as the carrying handle that adapts to a stand so the tray can be tilted, magnetic strips to stop overlays sliding – though I was a little concerned about the durability of these.

The tray can be used independently without a computer, and especially useful is its value as a communication aid. Indeed because it sits flat you can have a "concrete" reward such as a sweet and the fact that it is basically simple to operate – one technique for all operations. If a square is missed by accident it is simple to re-select, something that is often difficult on a Concept Keyboard.

You can use the limited Concept Keyboard software with the tray, but Toucan now needs to develop its own specific software for use with it. Toucan is mainly for children of early learning stages and the tray opens up the world of computers to the physically – though not mentally – handicapped and gives them the opportunity to independently operate a computer. Therefore the least they should be given is appropriate software and I have found very little, apart from the odd word processing type program.

In a nutshell the tray is simple to use though the manual does need putting into plain English. It has a lot of potential but the need for software is acute. The uses it could be put to are vast, even for the most severely handicapped. Even in an average school the pupils of an early age with poor motor control would find this approach interesting and useful.

Shelley Gibson

Calculated to help

Product: Symbolic Calculus
Price: £16.95 (disc)
Supplier: Maths Workshop, 45, Carson Road, London E16 4BD.
Tel: 01-511 5244

MATHS Workshop advertises itself as a new name in educational software. Judging by this first offering, Symbolic Calculus, it is aiming at a small, highly specialist section of the software market. In fact, this program will mean just about nothing to people who have not studied maths beyond O level.

Symbolic Calculus is designed to provide help with differentiation and integration – areas which have always caused problems for many maths students. The program is easy to use: Simply enter the expression you wish to differentiate or integrate and then leave it all up to the computer.

You are not just presented with an answer. Instead, the screen display gives you a step-by-step breakdown of the process, highlighting each stage by use of colour. The rules used for each step are also given. At any time a printer can be switched on from within the program to give a hard copy output as well. If you have no printer, and things move too fast, a single key stroke will pause the program.

Entering an expression is very straightforward. There's a simple line editor which enables you to move a cursor and modify any part of the expression. This is particularly useful when you've completed a problem as you can redisplay and edit the original expression. This could encourage some experimentation. The editor has a simple error checker which prevents the program from crashing and gives you sensible advice.

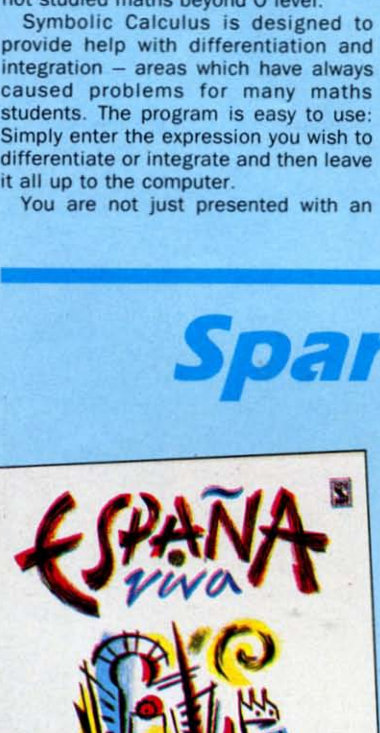
As well as the standard arithmetical functions – plus, minus, multiply, divide and to the power of – the program understands some 25 trigonometrical and other functions. The limits on the review version are that the original expression must contain no more than 126 characters and the solution must require no more than 45 lines. The review version was only compatible with the model B but a Master version should be available by now.

Symbolic Calculus is a very thorough program as far as the mathematics is concerned. It does seem a pity that more attention was not given to the screen display: There are occasions when words are split between two lines.

If this program had been available years ago, when I did A level maths, it would have been a great help with my homework – it would have done it for me. Any student who reads through the model solutions is bound to learn from them, so I can recommend this reasonably priced package for all those who need help with calculus.

Rog Frost

Spanish omelette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Supplier: BBC Soft, PO Box 234, Londor SE1 3TH.
Tel: 01-576 0548

DID you know that *anagram* is an anagram of *anagram*?

Let me explain: Assume you're writing an educational program to take a foreign word and scramble it into any old order (fingers crossed that it doesn't accidentally come out as a rude word in either language).

The learner's task is to unscramble the word. I think you might reasonably expect the program to check that your rearrangement doesn't by pure chance turn out to be in the same order as the original word. The package under review, I'm afraid, doesn't check this elementary point.

The offering concerned is published by BBC Enterprises, no less, to accompany the Espana Viva series on radio and TV. That's even less of a reason to allow the kind of goof which almost seems designed to give CALL – computer-assisted language learning – a bad name. There are three discs, a glossy manual (full of jokey little comments), and packaging to match.

But if you don't train your program to avoid the more obvious banana skins, no amount of gloss will stop you ruining the object of the exercise. And there's another little snag. Take the Spanish word *novia*. Juggle the letters and out you come with *vonia*. Fine, but now ponder a moment.

What would happen: If you put your thinking cap on and told the program that the answer was *avion*, a perfectly correct Spanish word? And just assume that the program had juggled the words round using its pseudo-random routine and by chance the result was not *vonia*,

Turn to Page 95 ▶

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- I think of my computer now as little more than an expensive error of judgement. It only seems to be capable of playing games.
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TO ORDER PLEASE USE THE FORM ON PAGE 159

Introduction to teletext

Product: Classfax
Price: £15
Supplier: Somasoft, 1 Lees Barn Road, Radcliffe-on-Trent, Nottinghamshire NG12 2DT.
Tel: 06073 4120

CLASSFAX is a daily excursion into teletext in the form of a computer magazine produced in the main for pupils by pupils.

It is a program for presentation to pupils at the start of the school day. Some of the input into the program is provided by the computer while the remainder is teacher or pupil generated.

It is aimed to give an introduction to the teletext type magazine encouraging screen reading and a medium for classroom activity.

When the program is loaded a menu appears which can be manufactured to incorporate part of the school name. Using the spacebar and the Return key Teacher, Pupil, Presentation or Poetry Writer can be chosen.

The first area, Teacher, allows for a variety of teacher inputs. They may take the form of listing the members of the class, giving credits to certain members for good work and organising the calendar for important dates, birthdays and visitors to the school and so on.

The Pupil option allows the pupil to make an area by area weather forecast of the main regions of Britain and also type in comments as to the weather prospects for the future.

There may be a variety of sports taking place in the school and the pupils can write a short report for cricket, football, hockey, rounders, chess and the like. There are problems using grids. In Trakword there is a nine square OXO type box each containing one letter and the pupil is allowed 100 seconds to see how many words he/she can make from the letters.

In Griddle the same format is used with number problems although this time a five by five square is used and number patterns have to be worked out. Later on it is possible for the pupil to send a message, produce school news and further weather details.

The final aspect of the program is Poetry Writer. This is sub-titled Haiku, poetry designed to have seventeen syllables. Disappointingly with this and other written parts of the program there is a requirement to type in accurately – there is unfortunately no delete facility.

Eventually after typing in all your information it is possible to work through the Presentation and see what has been achieved.

To my mind this is probably one of the most detailed efforts of programming I have come across on one disc, and Stuart Collins at Somasoft deserves great credit for the effort and ingenuity he has applied. The typing exercises and written messages I am sure would be eagerly read by the children but I feel with this type of activity the novelty would soon wear off and the enthusiasm would wane.

Although the accompanying handbook contains some useful help for developing a school topic on the weather, I feel there is little long term development to be gained from this type of program without the aid of some form of print out facility.

Gareth Gillingham

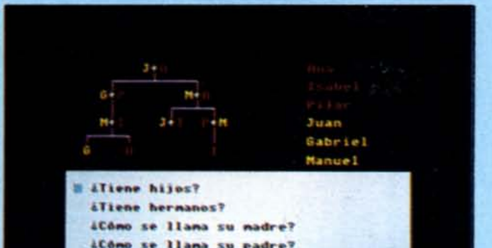
◄ *From Page 92*

but *novia* – which by definition excludes *novia* from being the right answer, in the eyes of the learner at least.

There really is little point in spending hours of precious time putting an educational program together unless you think through the implications of what you're writing – insofar as it's ever possible to do so, that is.

And the most important factor of all is not the pretty flashing colours or the raspberry a program blows if you get the answer wrong, it's the relationship between teacher and learner that simply mustn't be broken, otherwise the wholy shoddy edifice collapses.

And on top of that, the program offers a selection from a mere twenty words (after all that programming effort, however misguided). Nor does it wait for you to look at the correct answer at your leisure – if you blink, or if the phone rings at that moment, the correct answer is lost and gone for ever. And you don't even get to see the English equivalent unless you press one of the help buttons.



```
¿Tiene hijos?
¿Tiene hermanos?
¿Cómo se llama su madre?
¿Cómo se llama su padre?
```

Learning with Espana Viva

It's hard to drum up enthusiasm for the rest of the package which isn't without some nice programming ideas when a program from such a prestigious stable falls so spectacularly on its nose at the starting gate.

Elsewhere, the user interface isn't particularly brilliant, either. The clock program "will not accept nonsensical times." Oh yes it will: Type in: 8.60, and out comes the answer – 9 o'clock, "las nueve".

Also, when you're asked to type in a number between 1-100 you can type in 444, for example, only to be told "1-100 por favor."

Why not design the program in such a way as to avoid the possibility of an out of range number being keyed in by the user (por favor)?

No, for me, far from being Espana Viva, this is regrettably very much a case of Espana Muerta.

Rex Last

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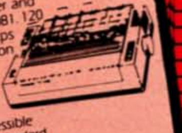

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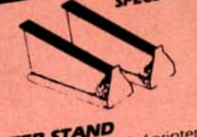

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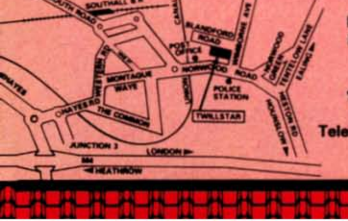

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Step-by-step instructions are given in the right-hand window of each section, but here are a few points to remember. You must load or design a new page before going to *Amend* and you can get a sample printout before or after save page.

The *Design new page* option wipes the existing page from memory, so make sure you have finished with it first. The left hand window represents a file page but because of the scale each text character – including a space – is shown by a dot.

When you are amending a page you must first rub out any unwanted areas and you can then repair any damaged lines or add new lines and text.

The program saves both a file of characters for each page and the screen itself to enable the layout to be amended later. This is fairly heavy on disc space so, once you have perfected a particular page, delete the screen file to save some room – when printing you only need the character file.

Tractor feed paper is available ready punched for personal file systems but it is sometimes hard to get hold of. But some deft manoeuvring of your nearest photocopier will produce double-sided pages

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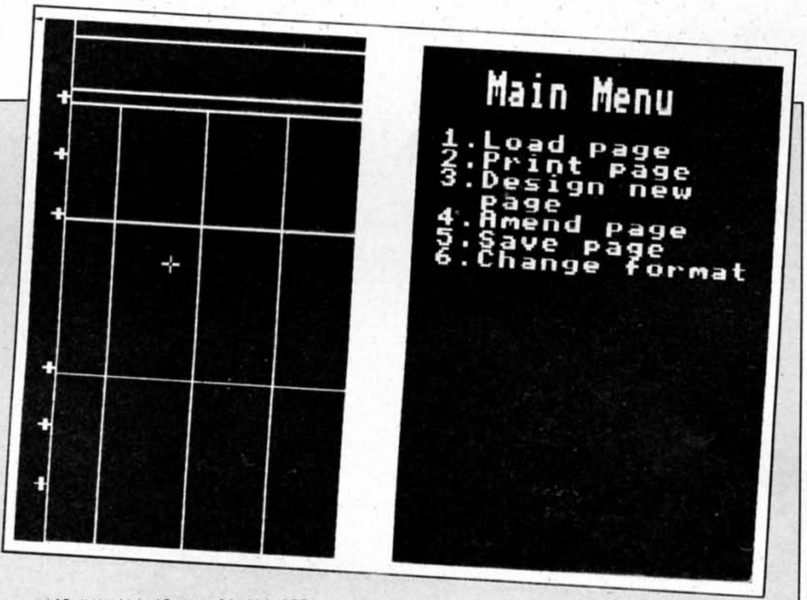
Now you can have all those specialist pages you have always wanted but no one has produced.



Main Menu

1.Load page
2.Print page
3.Design new
  page
4.Amend page
5.Save page
6.Change format

```
   10 REM Geo-Fax
   20 REM Geoff & Graham Hawkins
   30 REM (c) The Micro User
   40 *TV255
   50 MODE4:*FX11,32
   60 VDU19,0,7;0;19,1,4;0;
   70 VDU23;8202;0;0;0;26
   80 COLOUR129:CLS:*FX4,1
   90 PROCtwin(0,4,15,35,5)
  100 PRINT'" Design your own personal f
ile"'" pages with"
  110 PROCdb(1,"GEO-FAX",12,4)
  120 PRINT'SPC5"(c) G.D.& G.P.Hawkins"
  130 PRINT'SPC4"Press space to continue
";
  140 REPEAT UNTIL GET=32
  150 PROCwhich:PROCinit
  160 ON ERROR IF ERR=17 ELSE MODE7:REPO
RT:PRINT" at ";ERL:END
  170 COLOUR1:REPEAT REPEAT
  180 PROCmenu1:UNTIL k=54
  190 PROCwhich:UNTIL FALSE:END
  200 DEFPROCwhich
  210 PROCgwin(7,0,0,1279,1023)
  220 PROCtwin(0,4,15,35,5)
  230 PRINT'SPC(3)"Which format?"
  240 PRINT'SPC(8)"Horizontal......H"
  250 PRINT'SPC(8)"Vertical........V"
  260 REPEAT k$=GET$
  270 UNTIL INSTR("VvHh",k$)>0
  280 GCOL0,129:CLG
  290 IF INSTR("Vv",k$)>0 vt=TRUE:x=20:h
r=FALSE:PROCsetup:PROCsetv
  300 IF INSTR("Hh",k$)>0 vt=FALSE:x=14:
hr=TRUE:PROCsetacross:PROCseth
  310 ENDPROC
  320 DEF PROCtwdw(vt):VDU4
  330 IF vt PROCtwin(0,21,29,37,4) ELSE
PROCtwin(0,5,29,34,20)
  340 ENDPROC
  350 DEFPROCsetup
  360 PROCgwin(0,100,60,584,900)
  370 VDU5:FORL%=165TO355STEP95
  380 MOVE122,L%:PRINT"+":NEXT
  390 FORL%=605TO795STEP95
  400 MOVE122,L%:PRINT"+":NEXT
  410 MOVE144,60:PLOT21,144,900
  420 VDU4:ENDPROC
  430 DEFPROCsetacross
  440 PROCgwin(0,158,438,1114,900)
  450 VDU5:FORL%=285TO475STEP95
  460 MOVEL%,878:PRINT"+":NEXT
  470 FORL%=750TO940STEP95
  480 MOVEL%,878:PRINT"+":NEXT
  490 MOVE158,856:PLOT21,1114,856
  500 VDU4:ENDPROC
  510 DEFPROCmenu1
  520 amd=FALSE:PROCtwdw(vt)
  530 PROCdb(1,"Main Menu",3,1)
  540 PRINT'" 1.Load page"
  550 PRINT" 2.Print page"
  560 PRINT" 3.Design new"TAB(x)"page"
  570 PRINT" 4.Amend page"
  580 PRINT" 5.Save page"
  590 PRINT" 6.Change format"
  600 REPEAT k=GET
  610 IF INKEY-73 THEN *SAVE FAX1 5800 8
000
  620 UNTIL k>48 AND k<55
  630 IF k=49 PROCloadpage
  640 IF k=50 PROCprintpage
  650 IF k=51 PROCdesign
  660 IF k=52 PROCamend
  670 IF k=53 PROCsavepage
  680 ENDPROC
  690 DEFPROCsavepage
  700 REPEAT REPEAT CLS
  710 PROCdb(1,"Save page",3,1)
  720 PROCenterfile
  730 IF exists PRINT'SPC3"File exists"'
SPC3"overwrite?"'SPC5"(Y/N)":p$=GET$ ELS
E p$="Y"
  740 UNTIL INSTR("YynN",p$)>0
  750 UNTIL INSTR("Yy",p$)>0
  760 screen$="S."+file$
  770 PRINT'" Save screen"'" also? (Y/N
)":p$=GET$
  780 CLS
  790 IF INSTR("Yy",p$)>0 PROCoscli("*SA
```

Turn to Page 98 ▶

◀ From Page 97

```
VE "+screen$+" 5800 7FFF")
  800 C%=OPENOUTfile$:FOR I%=0 TO size-1
  810 BPUT#C%,page?I%:NEXT:CLOSE#C%
  820 k=9:ENDPROC
  830 DEFPROCloadpage:REPEAT CLS
  840 PROCdb(1,"Load page",3,1)
  850 PROCenterfile
  860 IF NOTexists PRINT'" File does"'
"not exist"'" please re-enter":PROCpause
  870 UNTIL exists:screen$="S."+file$
  880 C%=OPENINfile$:FOR I%=0 TO size-1
  890 page?I%=BGET#C%:NEXT:CLOSE#C%
  900 file$=screen$:PROCcheckfile
  910 IF exists PROCoscli("*LOAD "+scree
n$+" 5800")ELSE PRINT''" Page data"'" l
oaded"'" but screen"'" was not saved":PR
OCpause
  920 k=9:ENDPROC
  930 DEF PROCdesign
  940 IF vt PROCsetup ELSE PROCsetacross
  950 PROCm3:PROCemptypage
  960 PROCnewpage:ENDPROC
  970 DEF PROCamend
  980 X%=112:Y%=81:r%=39:c%=1
  990 amd=TRUE:PROCerase
 1000 PROCnewpage:ENDPROC
 1010 DEFPROCenterfile
 1020 PRINT''" Enter filename:"
 1030 INPUTSPC2file$
 1040 IF file$="" file$="faxpage"
 1050 IF LEN(file$)>7 file$=LEFT$(file$,
7)
 1060 PROCcheckfile:ENDPROC
 1070 DEFPROCm3:CLS
 1080 PROCdb(1,"Preparing",3,1)
 1090 PROCdb(1,"new page",4,4)
 1100 PRINT''" Please wait..":ENDPROC
 1110 DEFPROCnewpage:LOCAL k
 1120 REPEAT X%=112:Y%=81:r%=39:c%=1
 1130 VDU4:CLS:PROCpageoptions
 1140 REPEAT k=GET
 1150 UNTIL k>48 AND k<54 OR k=9
 1160 VDU4:CLS
 1170 IF k=49 PROCvlines
 1180 IF k=50 PROChlines
 1190 IF k=51 PROCtext
 1200 IF k=52 PROCsavepage
 1210 IF k=53 PROCprintpage
 1220 UNTIL k=9:ENDPROC
 1230 DEFPROCpageoptions
 1240 IF amd PROCdb(1,"Amend  Page",2,1)
 ELSE PROCdb(1,"New Page",3,1)
 1250 PRINT'" 1.Vertical"TAB(x)"lines"
 1260 PRINT" 2.Horizontal"TAB(x)"lines"
 1270 PRINT" 3.Text"'" 4.Save page"
 1280 PRINT" 5.Print page"
 1290 PRINT'" TAB to finish"
 1300 PRINT"ESC for Main menu"
 1310 ENDPROC
 1320 DEFPROCerase:LOCAL k:VDU4:CLS
 1330 PROCdb(1,"First erase",2,1)
 1340 PROCm4:REPEAT
 1350 REPEAT PROCmove:UNTIL k=32 OR k=9
 1360 IF k<>9 REPEAT PROCeraser:UNTIL k=
32 OR k=9
 1370 UNTIL k=9:ENDPROC
 1380 DEFPROCm1
 1390 IF vt PROCdb(1,"Lines",4,3) ELSE P
ROCdb(1,"Lines",13,1)
 1400 PRINT'" Use cursor keys"SPC2"to mo
ve"
 1410 PRINT'" SPACE to switch"SPC2"line
on/off"
 1420 PRINT'"TAB to finish"
 1430 PRINT"ESC for Main menu":ENDPROC
 1440 DEFPROCm2
 1450 PRINT'" Use cursor keys"SPC2"to mo
ve"
 1460 PRINT'" RETURN switches"SPC2"text
on/off"
 1470 PRINT'"TAB to finish"
 1480 PRINT"ESC for Main menu":ENDPROC
 1490 DEFPROCm4
 1500 PRINT'" Use cursor keys"SPC2"to mo
ve"
 1510 PRINT'" SPACE switches"
 1520 PRINT" eraser on/off"
 1530 PRINT'"TAB to finish"
 1540 PRINT"ESC for Main menu":ENDPROC
 1550 DEFPROCvlines:LOCAL k
 1560 PROCdb(1,"Vertical",3,1)
 1570 PROCm1:REPEAT
 1580 REPEAT PROCmove:UNTIL k=32 OR k=9
 1590 IF k<>9 REPEAT PROCvdraw:UNTIL k=3
2 OR k=9
 1600 UNTIL k=9:ENDPROC
 1610 DEFPROChlines:LOCAL k
 1620 PROCdb(1,"Horizontal",2,1)
 1630 PROCm1:REPEAT
 1640 REPEAT PROCmove:UNTIL k=32 OR k=9
```

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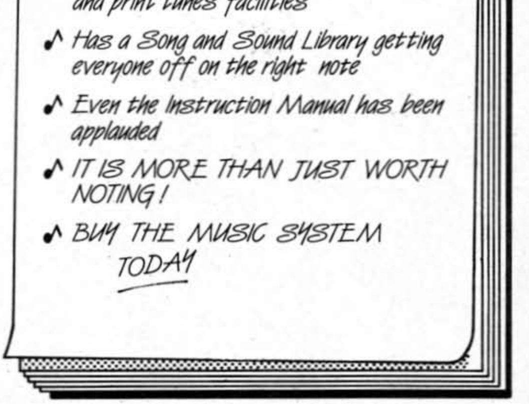
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```
1650 IF k<>9 REPEATPROChdraw:UNTIL k=32
OR k=9
1660 UNTIL k=9:ENDPROC
1670 DEFPROCtext:LOCAL k
1680 PROCdb(1,"Text",5,1)
1690 PROCm2:REPEAT
1700 REPEAT:PROCmove:UNTIL k=13 OR k=9
1710 IF k=9 UNTILTRUE:ENDPROC
1720 VDU5:i$=""
1730 REPEAT MOVEX%,Y%:VDU 225
1740 IF i$<>CHR$127 X%=X%+hstep:c%=c%+1
1750 i$=GET$
1760 IF i$=CHR$127 X%=X%-hstep:c%=c%-1
1770 IF X%>=maxx X%=minx:c%=leftcol:Y%=
Y%-vstep:r%=r%+1
1780 IF Y%<=miny Y%=miny:r%=height
1790 IF i$<>CHR$13 VDU4:PROCfillpage(i$
):VDU?FNc(r%,c%),5
1800 UNTIL i$=CHR$13 OR i$=CHR$9
1810 IF i$=CHR$13 VDU4:PRINT:VDU5
1820 UNTIL i$=CHR$9:ENDPROC
1830 DEFPROCtwin(c%,x%,y%,X%,Y%)
1840 COLOURc%+128:VDU28,x%,y%,X%,Y%
1850 CLS:ENDPROC
1860 DEFPROCgwin(c%,x%,y%,X%,Y%)
1870 GCOL0,c%+128:VDU24,x%;y%;X%;Y%;
1880 CLG:ENDPROC
1890 DEFPROCdb(C%,t$,x%,y%)
1900 LOCAL L%,X%,Y%:COLOUR C%
1910 FOR L%=1 TO LEN(t$)
1920 ?&70=ASCMID$(t$,L%)
1930 A%=10:X%=&70:Y%=0:CALL &FFF1
1940 VDU23,240,?&71,?&71,?&72,?&72,?&73
,?&73,?&74,?&74
1950 VDU23,241,?&75,?&75,?&76,?&76,?&77
,?&77,?&78,?&78
1960 VDU31,x%+L%-1,y%,240,8,10,241
1970 NEXT:PRINT:ENDPROC
1980 DEFPROCvdraw
1990 GCOL0,1:k=INKEY(10)
2000 IF k=138 Y%=Y%-vstep:r%=r%+1
2010 IF k=139 Y%=Y%+vstep:r%=r%-1
2020 IF Y%>=maxy Y%=maxy:r%=toprow
2030 IF Y%<=miny Y%=miny:r%=height
2040 DRAW X%,Y%:PROCfillpage(v$)
2050 ENDPROC
2060 DEFPROChdraw
2070 GCOL0,1:k=INKEY(10)
2080 IF k=136 X%=X%-hstep:c%=c%-1
2090 IF k=137 X%=X%+hstep:c%=c%+1
2100 IF X%<=minx X%=minx:c%=leftcol
2110 IF X%>=maxx X%=maxx:c%=width
2120 DRAW X%,Y%:PROCfillpage(h$)
2130 ENDPROC
2140 DEFPROCeraser:GCOL0,0:PROCcode
2150 MOVEX%,Y%:VDU226:GCOL0,1
2160 PROCfillpage(o$):ENDPROC
2170 DEFPROCmove:PROCcode
2180 PROCcursor:ENDPROC
2190 DEFPROCcode:k=INKEY1
2200 IF k=138 Y%=Y%-vstep:r%=r%+1
2210 IF k=136 X%=X%-hstep:c%=c%-1
2220 IF k=139 Y%=Y%+vstep:r%=r%-1
2230 IF k=137 X%=X%+hstep:c%=c%+1
2240 IF Y%>=maxy Y%=maxy:r%=toprow
2250 IF Y%<=miny Y%=miny:r%=botrow
2260 IF X%<=minx X%=minx:c%=leftcol
2270 IF X%>=maxx X%=maxx:c%=rightcol
2280 ENDPROC
2290 DEFPROCcursor:VDU5
2300 GCOL3,7:FOR C%=1 TO 2:*FX19
2310 MOVEX%-12,Y%:DRAWX%+12,Y%
2320 MOVEX%,Y%-12:DRAWX%,Y%+12
2330 NEXT:ENDPROC
2340 DEFPROCinit:z%=&20202020
2350 v$="!":h$="-":x$="+":o$=" "
2360 VDU23,225,128,128,128,0,0,0,0,0
2370 VDU23,226,-1;-1;-1;-1;
2380 size=height*width:DIM page size
2390 draw=FALSE:ENDPROC
2400 DEFPROCemptypage:LOCAL I%
2410 FOR I%=0 TO size-1 STEP 4
2420 page!I%=z%:NEXT:ENDPROC
2430 DEFPROCfillpage(i$)
2440 LOCAL C%:C%=FNc(r%,c%)
2450 IF CHR$?C%=v$ IF i$=h$ i$=x$
2460 IF CHR$?C%=h$ IF i$=v$ i$=x$
2470 ?C%=ASCi$:ENDPROC
2480 DEFPROCprintpage
2490 COLOUR0:LOCAL R%,C%
2500 VDU2,1,27,1,77,1,27,1,81,1,width
2510 PRINTx$SPC(spaces)x$
2520 FOR R%=1 TO height
2530 FOR C%=1 TO width
2540 VDU?FNc(R%,C%):NEXT:VDU13:NEXT
2550 PRINTx$SPC(spaces)x$
2560 VDU1,12,3:COLOUR7:ENDPROC
2570 DEFPROCcheckfile
2580 LOCAL C%:C%=OPENIN file$
2590 exists=(C%<>0):CLOSE#C%:ENDPROC
2600 DEFPROCsetv
2610 width=44:height=40:hstep=11
2620 vstep=21:spaces=42:maxy=900
2630 toprow=1:miny=60:botrow=40
2640 maxx=584:rightcol=44:minx=144
2650 leftcol=4:ENDPROC
2660 DEFPROCseth
2670 width=80:height=22:hstep=12
2680 vstep=21:spaces=78:maxy=837
2690 toprow=4:miny=438:botrow=22
2700 maxx=1118:rightcol=80:minx=158
2710 leftcol=1:ENDPROC
2720 DEFFNc(R%,C%)=page+(R%-1)*width+C%
-1
2730 DEFPROCpause:LOCAL now,then
2740 now=TIME:then=now+400
2750 REPEAT UNTIL TIME>then:ENDPROC
2760 DEFPROCoscli($&700):LOCAL X%,Y%
2770 Y%=7:CALL &FFF7:ENDPROC
```

Get it right!

This listing is included in this month's tape & disc offer. See order form on Page 159.

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 4ACF F
  50 =  4DC B
  60 = CF6A 1
  70 = CDC3 E
  80 = 2F27 5
  90 = FEFC 4
 100 = 99F8 3
 110 = 224A 0
 120 = E5D0 8
 130 =  CF2 5
 140 = 2B9E 9
 150 = 933E 6
 160 = F1ED F
 170 =  11D 8
 180 =  1DF 9
 190 = 975B 9
 200 = A1F6 D
 210 = F223 F
 220 = FEFC 7
 230 = 431B B
 240 = 4D54 B
 250 = 88EF F
 260 = F21E 9
 270 = 8151 2
 280 = 2BF7 3
 290 = 5297 D
 300 = D6E3 7
 310 = ED0F 5
 320 = F9DA 3
 330 = 7EC8 1
 340 = ED0F F
 350 = 2AA8 5
 360 = 20D1 2
 370 = 2F80 E
 380 = BB3F A
 390 = 5122 B
 400 = BB3F 8
 410 = FFD2 F
 420 = 4E30 7
 430 = B6CC F
 440 = E0C8 B
 450 = 61FA 4
 460 = 55E8 E
 470 = 1C89 6
 480 = 55E8 C
 490 = A6B1 2
 500 = 4E30 4
 510 = 3D1D 7
 520 = E4F0 2
 530 = 4FAE A
 540 = ED4E A
 550 = 5EB5 D
 560 = C1BF C
 570 = 1CE6 A
 580 = BC9E 5
 590 = 8405 A
 600 = D653 A
 610 = 6001 4
 620 = B83A 5
 630 = C29F A
 640 = AFF5 B
 650 = 211D 6
 660 = EE30 D
 670 = 6DBD 7
 680 = ED0F 9
 690 = 99E9 2
 700 = 5F1D 9
 710 = EEE6 1
 720 = 7031 C
 730 = 44E3 3
 740 = B2A1 A
 750 = E3D5 E
 760 =  D82 6
 770 = 36E6 6
 780 = 7A16 2
 790 = 672E E
 800 = 4E1E 9
 810 = 4083 F
 820 = BC29 D
 830 = 2FDE 1
 840 = C07B 0
 850 = 7031 3
 860 = FA40 7
 870 = 3EC5 C
 880 = 24B3 C
 890 = 3747 9
 900 = B09E C
 910 = 7C42 7
 920 = BC29 4
 930 = 7901 3
 940 = A67D C
 950 = CF3E 5
 960 = BF6A 7
 970 = B3CE 4
 980 = 4AF0 A
 990 = 3306 C
1000 = BF6A 0
1010 = C3F3 4
1020 = F063 7
1030 = 4AD5 E
1040 = B019 9
1050 = BE52 5
1060 = 8F90 B
1070 = FDCB 8
1080 = F474 0
1090 = CB4B C
1100 = 89B5 F
1110 = 5A55 6
1120 = 146F C
1130 = D3B2 4
1140 = D653 4
1150 = 1276 A
1160 = D929 1
1170 =  D7D 0
1180 = 3AC3 9
1190 = 477D 2
1200 = B5F4 D
1210 = AA6A D
1220 = 4CB3 6
1230 = 1A22 5
1240 = 6231 D
1250 = E5E3 0
1260 = 2414 D
1270 = 55B3 D
1280 = 94BD D
1290 = 5798 8
1300 = C228 2
1310 = ED0F 2
1320 = C462 7
1330 = 4A7E 4
1340 = 5700 B
1350 = AEA9 4
1360 = 80E1 D
1370 = 4CB3 5
1380 = 47B3 B
1390 = 7DDD F
1400 = 6604 F
1410 = A6DD E
1420 = 2D67 6
1430 = D20D E
1440 = 77D0 9
1450 = 6604 E
1460 = 83AF 0
1470 = 2D67 9
1480 = D20D E
1490 = 1716 4
1500 = 6604 B
1510 = F207 B
1520 = 9CEA 6
1530 = 2D67 D
1540 = D20D A
1550 = 64CF 3
1560 = 4736 C
1570 = BCF0 F
1580 = AEA9 E
1590 = FD2A D
1600 = 4CB3 3
1610 = C9AD 2
1620 = A55E 6
1630 = BCF0 D
1640 = AEA9 9
1650 =  DA5 2
1660 = 4CB3 B
1670 =  996 5
1680 = B3FD B
1690 = E5A0 7
1700 = 9512 D
1710 = 529B 0
1720 = 8F10 1
1730 = 3252 2
1740 = 89BC 5
1750 = C57F 4
1760 = E0AB 8
1770 = 183D 7
1780 = 7D25 4
1790 = EB69 1
1800 = 610C 2
1810 = 349D 1
1820 = 23EB C
1830 = 1D2E C
1840 = 1830 D
1850 = 9234 F
1860 = 28A8 6
1870 = 94DC B
1880 = A504 A
1890 = E282 A
1900 = B93F 4
1910 = F781 E
1920 = 197E D
1930 = B4E5 C
1940 = 3B35 2
1950 = D3B0 F
1960 = FA61 7
1970 = 8D07 0
1980 = 72BB B
1990 = 7517 6
2000 = E6E0 D
2010 = 92D7 4
2020 = 83E6 F
2030 = 7D25 3
2040 =  5E2 6
2050 = ED0F 0
2060 = B949 B
2070 = 7517 9
2080 = 59F1 3
2090 = 2DC6 9
2100 =  46E F
2110 = D7CD 7
2120 = 5D80 7
2130 = ED0F A
2140 = DBB3 1
2150 =  47E B
2160 = 367C C
2170 = C2F6 3
2180 = 6B88 2
2190 = A2F0 0
2200 = E6E0 E
2210 = 59F1 1
2220 = 92D7 D
2230 = 2DC6 8
2240 = 83E6 1
2250 = 9ECF 7
2260 =  46E 2
2270 = A9B3 6
2280 = ED0F C
2290 = A3F6 E
2300 = 12F3 4
2310 = 533F 6
2320 = B0E6 1
2330 = E531 0
2340 = 440A D
2350 = F3C1 F
2360 = AB9E 6
2370 = 8583 1
2380 =  E26 5
2390 = F04F 1
2400 = D2AD 3
2410 = 7780 D
2420 = 9C44 8
2430 = 9AA2 7
2440 = CDB5 9
2450 = DA3A 1
2460 = 8BAB F
2470 = 92C1 5
2480 = 51F1 A
2490 = 3873 5
2500 = E360 5
2510 = 67E2 2
2520 = 21CD 2
2530 = 1139 6
2540 = F6DB 1
2550 = 67E2 8
2560 = 7403 F
2570 = B76D 6
2580 = B3B9 6
2590 = 2164 A
2600 = E2DC 5
2610 = 6582 C
2620 = 99CD B
2630 = FFCC 9
2640 = 9CAF 6
2650 = E1E2 F
2660 = 1123 2
2670 =  49E D
2680 = 6772 6
2690 = 1CCA 2
2700 = 9F2E 5
2710 =  A12 C
2720 = C128 B
2730 =  7B4 8
2740 = EB06 E
2750 = 483B 4
2760 = AB72 6
2770 = DB66 C
```

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This voucher can be redeemed against any future purchase made from us.
Additionally we will offer discounts upto 10% on Archimedes software and upto 5% on Archimedes hardware stocked by us to all purchasers of Archimedes computers.
This is a limited period offer so do not miss your opportunity for a bargain not to be repeated.

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea)	£54(d)

Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger

GAMES:

ZARCH	£17(d)
Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.

Please check on availability of some of the above packages

FILE STORE

Acorn's new file server system

Filestore E01	£825(a)
Filestore E02	£699(a)

Full details on request

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.
Full spec on request £299(b)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£43.50(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25	£2.80(d)
27128-25 (12.5V Vpp)	£3.40(d)
27128-25 (21.0V Vpp)	£4.80(d)
6264LP-15	£2.40(d)
27256	£5.00(d)
27512	£9.90(d)

MASTER SERIES

AMB15 Master 128K	£346(a)
AMC06 Turbo 65C102 Module	£95(b)
ADC08 512 processor	£185(b)

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 2ROM Cartridge	£7.50(d)	TRC4 4ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£29(d)	Master Dust Cover	£4.75(d)

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface	£265(b)
Universal CoProc Adapter	£69(b)
512 Co Proc for Model B (incl DOS+ & GEM suite)	£249(b)

Send for detailed list of DOS software for 512

MASTER COMPACT

All Master Compact computers come complete with 128K RAM and an integral 640K 3.5" drive with educational software.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12" Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14" Med Res Col Monitor	£475 (2xa)
Compact 2nd Drive Kit	£95(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter (upgrades Compact to almost Master level)	£35(c)
External Drive adapter Cable	£9(d)

SPECIAL OFFERS

Acorn 32016 Co Processor	£899(a)
10MHz upgrade for 32016 (incl free fitting)	£175(a)
AcornSoft C	£52(d)
View Professional Master Ver	£69(c)
ISO PASCAL Master, B&B+	£46(b)
TRC32 32K RAM Cartridge incl RAM	£21(d)
Master Operating System book	£6.95(d)
Mastering Interpreters & Compilers	£9.95(d)
Seikosha GP700 Colour Printer	£120(a)
Plotmate A4 Plotter	£195(a)

The products listed above are brand new but carry no warranty

SANYO CRT 70
14" Hi Resolution RGB Monitor
£209
RRP £429 12 months Warranty

RAM/ROM EXPANSION

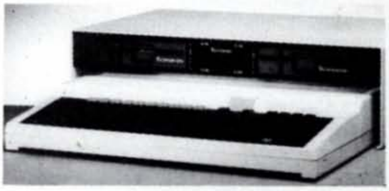
ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2*8K RAMS	£37(c)
ATPL Battery backup kit	£18(d)
ATPL Board for BBC+	£31(c)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

TECHNOMATIC DISC DRIVES

TS 400



PD 800P

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.

5.25″ Single Drives 40/80 switchable:	
TS400 400K/640K	**£90(b)**
PS400 400K/640K with integral mains power supply	**£104(b)**
5.25″ Dual Drives 40/80 switchable:	
TD800 800K/1280K	**£170(a)**
PD800 800K/1280K with integral mains power supply	**£190(a)**
PD800P 800K/1280K with integral mainspower supply and monitor stand	**£209(a)**
3.5″ 80T DS Drives:	
TS351 single 400K/640K	**£67(b)**
PS351 single 400K/640K with integral mains power supply	**£85(b)**
TD352 Dual 800K/1280K	**£126(b)**
PD352 Dual 800K/1280K with integral mains power supply	**£149(b)**
Combo Drives (5.25″ & 3.5″ drives)	
PD853 with integral psu	**£165(a)**
PD853P with integral psu	**£179(a)**
DISC DRIVE MULTIPLEXER **see page 5 of this ad for details** ***For Master, B, B+ and any DFS/ADFS***	
TDM2 Two computers/one drive unit	**£65(b)**
TDM4 Four computers/one drive unit	**£115(b)**

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive	**£429(a)**
P30HD 30Mb Winchester Drive	**£449(a)**
P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM	**£749(a)**
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	**£609(a)**
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	**£1179(a)**
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	**£599(a)**
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	**£19(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer	**£28**

WINCHESTER Drive Multiplexer

These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers.	**£99 (b)**
TWM4 for four Computers.	**£149 (b)**

NEW

Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master. £449(a)

3M FLOPPY DISCS

5.25″ Discs in packs of 10

744	40T SS DD	**£8.20(d)**
745	40T DS DD	**£10(d)**
746	80T SS DD	**£12.25(d)**
747	80T DS DD	**£13.00(d)**

3.5″ Discs in packs of 10

80T SS DD	**£15(d)**
80T DS DD	**£19.50(d)**

(Add £1 for library case packing)

FREE **Leatherbound Personal Organiser**
with every 50 3M discs

BULK DISCS

50 5.25″ 40 T single sided discs with sleeves in lockable box.	**£25(b)**
50 5.25″ 80 T double sided discs with sleeves in lockable box.	**£32(b)**
50 3.5″ 80T double sided discs with sleeves in lockable box.	**£60(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25″ Kit with 20 disposable discs	**£14.00(d)**
3.5″ Kit with 20 disposable discs	**£14.75(d)**

DISC STORAGE BOXES

DB340 Lockable 40 × 3.5″	**£8.50(c)**
DB550 Lockable 50 × 5.25″	**£6.50(c)**
DB570 Lockable 70 × 5.25″	**£8.50(c)**
DB5100 Lockable 100 × 5.25″	**£10.50(c)**

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

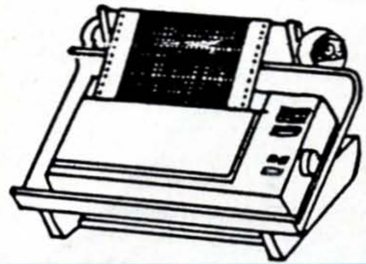
PRINTERS

EPSON LX800	£180(a)
EPSON FX800	£295(a)
EPSON FX1000	£405(a)
EPSON EX800	£395(a)
EPSON EX1000	£539(a)
Colour option for EX800/EX1000	£55(b)
EPSON LQ500	£349(a)
EPSON LQ850	£439(a)
EPSON LQ1050	£529(a)
EPSON GQ3500 Laser Printer	£1350(a)
TAXAN KP815	£269(a)
TAXAN KP915	£369(a)
NATIONAL PANASONIC KXP1081 *	£149(a)
NATIONAL PANASONIC KXP 1082*	£175(a)
STAR LC10	£209(a)
INTEGREX Multicolour Inkjet printer	£519(a)
BROTHER HR20	£349(a)
NAT PANASONIC KX P3131 includes massive buffer of 38K	£249(a)
JUKI 6100 Daisy wheel printer	£295(a)
BBC/Master Parallel Printer Lead (1.2m)	£5(d)
BBC/Master Parallel Printer Lead (2m)	£7(d)
Compact Parallel Printer Lead (1.2m)	£9(d)
Archimedes Parallel Printer Lead (2m)	£9(d)

**** Price includes Free Master printer lead and WYSIWYG + ROM***

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



MODEMS

All modems listed below will be supplied with a BBC data lead.

MIRACLE WS4000 V21/23	£135(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£409(b)
MIRACLE WS3000 V22 bis	£537(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)
WS2000 Auto Dial Card	£27(d)
WS2000 Auto Answer Card	£27(d)
S2000 SKI Kit	£5(d)
WS2000 User Port Lead	£5(d)

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program **£29(d)**

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£465(a)
Plotmate A4S	£420(a)
Plotmate A3M	£640(a)
Roland 880 A3 Flat bed 8 col	£599(a)

Variety of Plotter pens and accessories in stock.

Large Plotters available. Please enquire.

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer

Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers. Facility to print copies. **£189(b)**

BUFFALO PB Buffer

Parallel buffer for internal fitting to most Epson printers. Simple to instal.

PB128 (128K) **£89(c)**

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers		25v25-x	£49(c)
X-over 36v37-x	£49(c)		
BBC Cable Set 3 to 1 (1m ea)	£24(c)		
BBC Cable Set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11″	£12 (£3.50)
2000 sheets 14½ × 11″	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1⁷⁄₁₆	£5(d)
Triple Row 2⁷⁄₁₆ × 1⁷⁄₁₆	£5(d)

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) EpromRyter is compatible with BBC Master only. See page 7.	£89(b)
Upgrade of Epromer II to Eprom Ryter (Please return your Epromer II)	£49(b)
EPROMER II	£89(b)
MPROMER	£49(c)
META ASSEMBLER	£145(b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145(b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47(b)
UV1T 6 eproms, timer, safety cutout	£59(b)

MONITORS

All Monitors supplied with a suitable lead.

12″, 14″ and 20″ MONITORS

Microvitec 1431 Std Res, 14″	£179(a)
Microvitec 1431AP Std Res + PAL/Aud, 14″	£199(a)
Microvitec 1451 Med Res, 14″	£225(a)
Microvitec 1451AP Med Res + PAL/Aud, 14″	£255(a)
Microvitec 1441 Hi Res, 14″	£359(a)
Philips 14″ RGB Med Res, 14″, high contract screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers.	£195(a)
Sanyo CRT 70 14″ High Resolution Monitor	£209(a)

Resolution better than Microvitec 1441, suitable for Master, Archimedes.

Microvitec 2030CS 20″ Standard Resolution RGB/Comp Video	£380(a)
Microvitec 2040CS 20″ High Resolution RGB/Comp Video	£675(a)
TAXAN SUPER VISION 620 12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£269(a)
TAXAN SUPER VISION 625 12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£319(a)
TAXAN 770+ MultiSysnc Autoscan 14″, ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand	£499(a)

12″ MONOCHROME MONITORS

PHILIPS BM 7502 Hi Res green screen	£69(a)
PHILIPS BM7522 Hi Res amber screen	£75(a)

SPECIAL

for this month

Swivel Stand for Philips Mono monitors £6(c)

(if purchased with monitor)

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)

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CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)

MOUSE

AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£59 (d)
STOP PRESS (Pagemaker)	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE	£34 (c)

RB2 TRACKER BALL

RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£69 (b)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL (BBC)	£69 (c)
VIEW 2.1	£35 (d)
VIEW 3.0	£48 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£8 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PL	£21 (d)
SPELLMASTER	£47 (d)
INTERWORD	£39 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£37 (d)
WINDOMATIC (A Viewsheet Utility)	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£37 (d)
INTERCHART	£26 (d)
ULTRACALC	£26 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)
MEGA 3Rom	£82(b)

CC's integrated package offering Interword, Intersheet & Interchart on one 128K ROM. For Master, Compact, B+ & B

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	£145 (b)
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£39 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£39 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
MAYA Comms Package **See next page for details** NEW	£49
MODEM MASTER	£11 (d)
COMMAND	£34 (d)
MASTER TERMULATOR	£34.75 (d)

UTILITIES

ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£19 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual Cassette	£9.50 (d) £9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d)
FONTWISE PLUS	£17 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

COMPACT (all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc£16 (c)
PICTURE CRAFT	Disc£17 (d)
INTRODUCING GEOGRAPHY	Disc£16 (d)
MATHS WITH A STORY 1	Cass£8 (d)
MATHS WITH A STORY 2	Cass£8 (d)
NUMBER GAMES	Cass/EC£7.50 (d)
USING YOUR COMPUTER	Cass£24 (c)
THE HALL OF MIRRORS	Disc£13 (d)
MATHS	Disc+AudCas£17(d)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Disc£17 (d)
INSIDE INFORMATION	Prog Cass£10 (d)
Book£8 (d)	Audio Cass£5 (d)
OPEN LEARNING PACK	Disc/AudCas+book£36(b)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc£14 (d)
S.T.:RELATIONSHIPS	Disc£14 (d)
S.T.:BONDING	Disc£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	(d)
S.T.:ELECTRONICS IN ACTION	Disc£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc£19 (d)
S.T.:ECOLOGY	Disc/EC£19 (d)
S.T.:POLYMERS	Disc/EC£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc£20 (d)
S.T.:FOOD & POPULATION	Disc£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)
BIRD SPY	Disc£13 (d)
GEORDIE Racer	Disc£13 (d)

GENERAL

VU-TYPE PROFESSIONAL	Disc£19 (d)
WHITE KNIGHT MK II (for 1770 DFS)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Disc£20 (d)
Book£5.25 (d)	**Aud Cass(2)£7 (d)**
ESPANA VIVA	Disc£19 (d)
Audio Cass(2)£8 (d)	**Book£6.95 (d)**
	(2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC£16 (c)
	Book£5.95 (d)
BLACK QUEEN A long awaited bridge game. (1770DFS)	£13(d)
BISMARCK History of the famous battleship. (1770DFS)	£13(d)

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BOOKS

No VAT Carriage Code (c)

LANGUAGES

6502 Assy Lang Prog	£19.95
6502 Programming	£13.95
8086 Book	£23.95
Acorn BCPI User Guide	£15.00
Acorn FORTH	£7.50
Acorn LISP	£7.50
Acorn ISO Pascal Ref Manual	£10.00
Intro to COMAL	£10.00
Intro to LOGO	£7.50
Micro Prolog Ref Manual	£10.00
Introduction to Turbo Pascal	£14.95
Prog the Micro with Pascal	£8.50
The Supervisor's BBC Micro	£10.95

BBC MICRO GUIDE BOOKS

Inside Information	£8.95
Maths Prog in BBC Basic	£7.95
The Friendly Computer Book	£4.50
Toolbox 2	£10.95

ARCHIMEDES

Archimedes Reference Manual	£29.95(b)
ARM Assembly Language Prog	£12.95(b)

PROGRAMMING/UTILITY

Advanced Sideways Ram User Guide	£9.95
Advanced User Guide (BBC)	£15.95
Applied Assembly Language on the BBC	£9.95
BBC Micro Advance Programming	£9.95
BBC Micro Ref Guide (B Smith)	£10.95
BBC Micro Sideways ROM's RAM's	£9.95
Guide to the BBC Rom	£9.95
Beginners Guide to W.P.	£7.95
Mastering Assembly Code	£8.95
Mastering Interpreters & Compilers	£14.95
Master Operating System	£12.95
Mastering View, Viewsheet & Viewstore	£12.95
View by B. Smith	£12.95
View 3.0 User Guide	£9.00
Viewstore User Guide	£9.00
Viewsheet User Guide	£9.00
Wordwise Plus	£9.95

SOUND & GRAPHICS

Computer Graphics & CAD Fundementals	£9.95
Mastering Music	£6.95

DISC DRIVE SYSTEMS

Advanced Disc User Guide	£16.95
Disc Book	£3.50
Disc Programming Techniques	£7.95
Disc Systems	£6.95
File Handling on the BBC	£6.95
Discovering Disc Drives	£POA
Practical Disc File Techniques	£5.95
Mastering the Disc Drive	£12.95
Mastering DOS plus	£12.95

APPLICATIONS

Interfacing Proj for BBC	£6.95
BBC and Small Business	£5.75
The Software Business	£5.50

Mastering Operating System (David Atherton) £6.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

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WYSIWYG PLUS is designed to work with the following systems:

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WYSIWYG PLUS workspace is relocatable.

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Menu driven software provides the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems.

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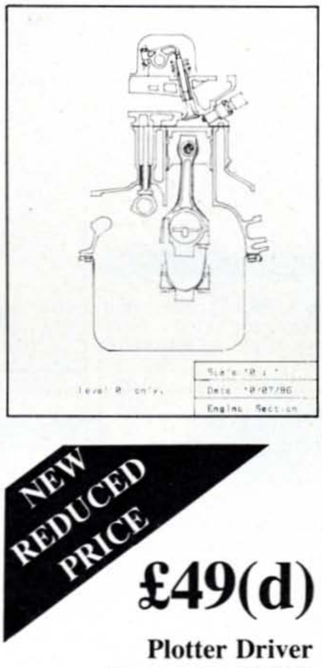

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NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

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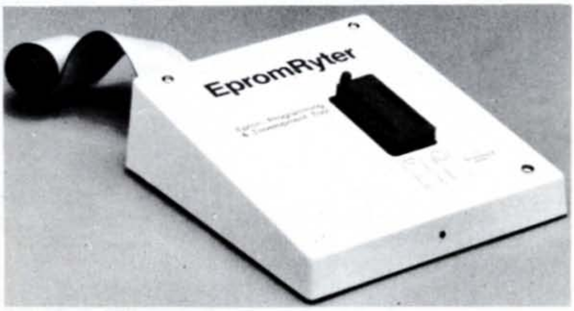
EpromRyter



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* Multiple loading for ROM Filing System

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A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

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"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach." **Acorn User October 1986**

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PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

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Way to easier editing

Further enhance the View word processor with twin utilities from Chris Nixon

YOU may remember my Ruler utility from the November 1987 issue of *The Micro User*, which printed a copy of the View editing cursor at the top of the screen. This prompted a spate of interested replies from readers about the possibility of publishing other View utilities.

Which brings us to Supershift, a utility designed to help speed your typing. The idea is that while word processing Supershift lets you concentrate on typing without having to remember such mundane requirements as a capital letter at the start of each sentence or a space after each comma, full stop, semi-colon and so on.

Before you write in to say – quite rightly – that this can only lead to bad writing habits, I should point out that Supershift was written with those people in mind who experience difficulty in coordination, caused by anything from arthritis to more serious disabilities like Multiple Sclerosis, spasticity and so on.

What Supershift does is anticipate what you are trying to type, after a fashion, and then does it for you. When active, every keypress is examined to see if it is one of the cases shown in Table I.

If it was one of the first six – full-stop, comma, semi-colon, question mark, exclamation mark or ampersand – a space is automatically added after that character, and if the keypress was a full-stop, the Caps Lock key is automatically engaged ready for the start of a new sentence.

However, if the key pressed was a capital letter – case seven – then the Caps Lock key is automatically disengaged ready for the body of the sentence. Capital letters may be entered at any time by holding down the Shift key at the same time. This is because the computer must be considered as operating in lower case while Supershift is active.

Cursor check

The second View utility is Cursor, and its purpose is to constantly print the numerical value of the current horizontal cursor position at the top of the screen.

Cursor works in any screen mode, which complements the earlier Ruler utility quite nicely, as Ruler will not work in Mode 7.

The display is of the format *Col:NN* where *Col* stands for column and *NN* is a two digit decimal number showing the cursor's X coordinate.

This display is printed whenever input is expected from the keyboard, as this is the most efficient method of obtaining a constant display other than diverting precious processing time from the CPU by using interrupts.

To ensure that the Tab markers in View are not obscured, printing of Cursor's status message begins at the 12th column. This places it right between two tab markers, while preserving the FJI flag indicators at the top left of the screen.

The status message will be inverted – black on white – in all modes other than seven.

Although Cursor will work in most languages, it has the ability to determine whether you are using View. If you are, it adjusts the value before printing to show 0 if the cursor is either at the first text column or inside the left margin. This is desirable for accurate editing, as the text area in View starts at the fourth physical screen position.

Supershift and Cursor are designed to work with each other, and the pair will work alongside View Ruler. Together they prove three useful enhancements to the already powerful environment of the View word processor.

1	Full stop	.
2	Comma	,
3	Semi-colon	;
4	Question mark	?
5	Exclamation mark	!
6	Ampersand	&
7	Capital letter	A-Z

Table I: Supershift special cases

How to use supershift

Type in Listing I and save it under a suitable filename but not *Shift*. Run the program, making sure that if you are using cassette, the tape is wound on to an unused part. After a few moments the assembled machine code will be saved as *Shift*.

Type *RUN SHIFT to load in Supershift. You will find that Basic programming with Supershift active is more of a hindrance than a help, so its default state after loading is off. To turn it on and off from the command mode of View – it also works with Wordwise – type **CODE n*, where *n* is either 0 for off, or 1-255 for on. Either action will engage the Caps Lock key.

Using cursor

Type in Listing II and save it as anything but *Cursor*. Run the program, and after a short pause the assembled machine code will be saved as *Cursor*.

Type *RUN CURSOR to activate the program. Note that once run, Cursor cannot be disabled other than by pressing the Break key, in which case type CALL &A00 from Basic to restart it.

Master 128 and Compact owners can type *GO A00 directly from View's command mode.

While active, Cursor disables all cursor editing when you are not working on View documents, as otherwise strange effects could occur.

How supershift works

The program works by intercepting the buffer insert vector – INSV – at &22A-&22B, through which all insertions into the keyboard buffer are passed.

The address of Supershift's main control routine is then stored in the vector, so the computer is forced to call Supershift every time a key is pressed. The old contents of the vector are stored for future use.

At this point the accumulator will contain the Ascii code of the key just pressed, and it is stored for future examination while the other registers are pushed on the stack.

Next the keypress is retrieved and examined for any of the cases shown in Table I. If it finds that a space character needs to be inserted into the keyboard buffer, Supershift has a problem: It cannot use Osbyte &8A – insert value into designated buffer – because we have changed the vector's contents and we would simply re-enter Supershift once more.

However, we can call osbyte &8A directly by jumping straight to its actual entry point as stored in the original vector which we copied for safekeeping at the start.

Engaging and dis-engaging the Caps

Turn to Page 109 ►

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◄ *From Page 107*

Lock key is quite simple. Osbyte &CA – read/write keyboard status byte – is called with the Y register set to mask out all bits except four – Caps Lock status – while the X register contains the new value for that bit.

If the keypress was not one of the cases in Table I control is passed back to the OS by pulling all the registers off the stack, and jumping through our copy of the old vector.

BBC B users will lose the use of function keys, while Master 128 or Compact owners will be unable to use Econet.

How cursor works

The routine intercepts the osrdch – Operating System ReaD CHaracter – vector at &210-&211. After the address of the routine *patch* is placed in this vector any subsequent keyboard input will cause the current cursor X-coordinate to be printed.

The basic principles here are similar to those used in Supershift, so I will not dwell on them apart from a quick check made at locations &8009-&800D in the current rom to tell whether we are in View.

If so, another check is made to see if there is an = sign at the start of the current line. If not then we are in View's edit mode and a value of three must be subtracted from the cursor's position before it is printed.

Program I

```
 10 REM ************************
 20 REM *      SuperShift      *
 30 REM *   By Chris Nixon     *
 40 REM * (c) The Micro User *
 50 REM ************************
 60 REM
 70 MODE7
 80 FORPASS=0TO3 STEP3
 90 P%=&B00:RESTORE
100 [OPT PASS
110 LDA &22B:CMP #supershift DIV 256
120 BEQ skipvector:STA &233
130 LDA &22A:STA &232
140 LDA #supershift MOD 256:STA &22A
150 LDA #supershift DIV 256:STA &22B
160 LDA &200:STA &234
170 LDA &201:STA &235
180 LDA #code MOD 256:STA &200
190 LDA #code DIV 256:STA &201
200 .skipvector
210 LDA #0:STA flag:RTS
220 .code
230 BNE notcode
240 STX flag:JMP capson
250 .notcode
260 JMP (&234)
270 .supershift
280 STA char:PHP:TXA:PHA:TYA:PHA
290 LDA flag:BEQ exit
300 LDA char:LDX #5
310 .checkloop
320 CMP table,X:BEQ found
330 DEX:BPL checkloop
340 CMP #65:BCC exit
350 CMP #91:BCS exit
360 JSR capsoff
370 .exit
380 PLA:TAY:PLA:TAX:PLP:LDA char
390 JMP (&232)
400 .found
410 LDA table,X:STA match
420 CMP #ASC".":BNE nocaps
430 JSR capson
440 .nocaps
450 JSR insert:LDA #32
460 STA char:JMP exit
470 .insert
480 LDA match
490 LDX #0:JMP (&232)
500 .capson
510 LDA #202:LDX #0:LDY #&EF:JMP &FFF4
520 .capsoff
530 LDA #202:LDX #16:LDY #&EF
540 JMP &FFF4
550 .flag:BRK
```

Turn to Page 110 ►

REALTIME SOLIDS MODELLER

Reviews of the original REALTIME GRAPHICS SYSTEM:
"there is no other software to rival it"-Beebug.
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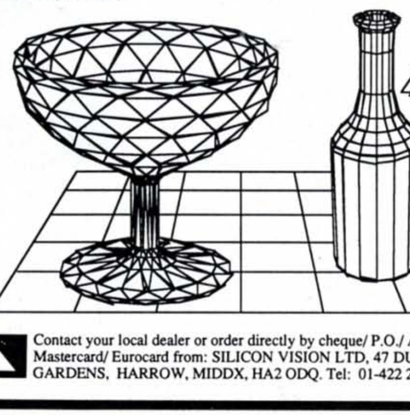
Minimum requirements: BBC B/keyboard/single drive. Also compatible with BBC B+, Master series, all versions of DFS & DDFS. The system will also take advantage of a 6502 2nd Processor/Turbo or AMX/QUEST Mouse. Prices: REALTIME SOLIDS MODELLER: £89.95 (inclusive); SOLIDS UPGRADE (return original RGL rom with order): £39.95 (inclusive).

S V Silicon Vision



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◀ From Page 109

```
560 .char:BRK
570 .match:BRK
580 .table:OPT FNchars
590 ]
600 NEXT
610 *SAVE SHIFT B00+100
620 END
630 DEF FNchars
640 FOR L%=1 TO 6
650 READ B$:B%=ASC(B$)
660 ?P%=B%:P%=P%+1
670 NEXT
680 =PASS
690 DATA "."
700 DATA ","
710 DATA ";"
720 DATA "?"
730 DATA "!"
740 DATA "&"
```

Get it right!

```
 10 =    0 0 | 260 = 9EB6 8 | 510 = 2727 C
 20 =    0 0 | 270 = 4A14 A | 520 = 4AC0 0
 30 =    0 0 | 280 = 780E 8 | 530 = 761C A
 40 =    0 0 | 290 = 75A0 A | 540 = 3DEE 4
 50 =    0 0 | 300 = 9A71 3 | 550 = FAC4 9
 60 =    0 0 | 310 = 2CA5 7 | 560 = 54B1 E
 70 = 8AFC C | 320 = 58DF 3 | 570 =  5D7 D
 80 = 27F1 3 | 330 =  24E F | 580 = 12EC 0
 90 = FD9E 6 | 340 = 4679 2 | 590 = 8B58 5
100 = DD44 3 | 350 = 7AFB A | 600 = 2C83 C
110 = C73E C | 360 =  F3A 1 | 610 = 372F B
120 = 1776 C | 370 = DC83 4 | 620 = FD2E 7
130 = FFF5 7 | 380 = 992E C | 630 = 4E75 5
140 = 5658 F | 390 = 3410 E | 640 = BE35 9
150 = 90F9 7 | 400 = DB31 2 | 650 = EEF2 4
160 = 8F44 D | 410 = C3E5 3 | 660 = C69E E
170 = F020 2 | 420 = 5162 4 | 670 = 2C83 D
180 = 256B F | 430 = 9AA8 6 | 680 = 4348 7
190 = C388 E | 440 = D718 0 | 690 = 42E8 E
200 = 4AF1 B | 450 = FB2D 3 | 700 = 248A C
210 = E2E6 E | 460 = 6E3E 5 | 710 = BE6E 7
220 = 49A5 8 | 470 = 64EA 8 | 720 = 72AA C
230 = FD45 3 | 480 = E32E A | 730 = 52D6 5
240 = 5DAA 6 | 490 = 1C38 6 | 740 = CB41 4
250 = E4C9 7 | 500 = 2B5A 0 |
```

Program II

```
 10 REM *************************
 20 REM * Cursor Column Display *
 30 REM *     By Chris Nixon    *
 40 REM *  (c) The Micro User   *
 50 REM *************************
 60 REM
 70 MODE7:viewflag=&93:xpos=&94
 80 ypos=&95:num=&96:char=&97
 90 vector=&98:FORPASS=0TO2STEP2
100 P%=&A00:[OPT PASS
110 LDA #patch DIV 256:CMP &211
120 BEQ skipvector:PHA:LDA &210
130 STA vector:LDA &211:STA vector+1
140 LDA #patch MOD 256:STA &210
150 PLA:STA &211
160 .skipvector
170 RTS
180 .patch
190 PHP:PHA:TXA:PHA:TYA:PHA
200 LDA #134:JSR &FFF4:STX xpos
210 STY ypos:LDA &8009:CMP #ASC"V"
220 BNE notVIEW:LDA &800D:BNE notVIEW
230 LDX #0:LDY ypos:JSR tab:LDA #135
240 JSR &FFF4:CPX #ASC"=":BEQ notVIEW
250 LDA #1:STA viewflag:JMP display
260 .notVIEW
270 LDA #0:STA viewflag:LDA #4:LDX #2
280 LDY #0:JSR &FFF4
290 .display
300 LDX #11:LDY #0:JSR tab
310 LDA #0:JSR colour:LDA #135
320 JSR colour:LDX #0:LDY #3
330 .textloop
340 LDA text,X:JSR &FFEE:INX:DEY
350 BPL textloop:LDA xpos:JSR decimal
360 LDA #7:JSR colour:LDA #128
370 JSR colour:LDX xpos:LDY ypos
380 JSR tab:PLA:TAY:PLA:TAX:PLA:PLP
390 JMP (vector)
400 .tab
410 LDA #31:JSR &FFEE:TXA:JSR &FFEE
420 TYA:JMP &FFEE
430 .colour
440 PHA:LDA #17:JSR &FFEE:PLA
450 JMP &FFEE
460 .decimal
470 STA num:LDA viewflag:BEQ leave
480 SEC:LDA num:SBC #3:STA num
490 .leave
500 LDA #0:STA char:LDA num:BEQ print
510 BMI print
520 .decloop
530 DEC num:SED:CLC:LDA char:ADC #1
540 STA char:CLD:LDA num:BNE decloop
550 .print
560 LDA char:LSR A:LSR A:LSR A:LSR A
570 JSR ascii:LDA char:AND #15
580 .ascii
590 CLC:ADC #48:JMP &FFEE
600 .text:EQUS"Col:"
610 ]
620 NEXT
630 "SAVE CURSOR A00 "+STR$~P%
```

Get it right!

```
 10 =    0 0 | 120 = 991E B | 230 = 9B32 7 | 340 = 78CD 1 | 450 =  60B 1 | 560 = 4E6A 9
 20 =    0 0 | 130 = AD39 B | 240 =  E4E 3 | 350 = D2C2 7 | 460 = 9A1C F | 570 = BD38 8
 30 =    0 0 | 140 = EBB9 4 | 250 = AB1A D | 360 = 164C 1 | 470 = B179 E | 580 = 5189 F
 40 =    0 0 | 150 = FF49 C | 260 = 63C5 E | 370 = 5F0A 5 | 480 = AA07 C | 590 = F2A3 A
 50 =    0 0 | 160 = 4AF1 8 | 270 = BD68 A | 380 = 6A93 9 | 490 = F06C 4 | 600 = F1E8 F
 60 =    0 0 | 170 = 9843 9 | 280 = AF64 E | 390 = A168 7 | 500 = 739F 7 | 610 = 8B58 9
 70 = 6949 9 | 180 = 3054 5 | 290 =  8D1 5 | 400 = E523 C | 510 = 5B75 3 | 620 = 2C83 8
 80 = 5329 0 | 190 = A5E9 F | 300 = FFF9 A | 410 = FC74 6 | 520 = B88B 9 | 630 = FD7B B
 90 = A024 B | 200 = 2DBB 4 | 310 = FD50 6 | 420 = 18C9 D | 530 = 7A4A 6 |
100 =  2C0 2 | 210 = 7708 F | 320 = 40C5 B | 430 = B960 B | 540 = 6C6D 1 |
110 = 737D 2 | 220 = 25F7 A | 330 = B930 E | 440 = 7E56 8 | 550 = 14FC 1 |
```

Check your Leaky listings corrections

The program outputs a hex number, so line 100 should read:

```
100 REM Machine code hex output
```

In line 130 the FOR...NEXT loop should be incrementing, not decrementing.

```
130 MODE 7:FOR Q%=0 TO 2 STEP 2
```

OPT Q% should be specified in line 150, not P%. Also the square bracket – indicating machine code is following – is wrong. It should be an opening bracket [:

```
150 [OPT Q%
```

In line 170, the call should be made to *printhex2* not *printhex4*.

```
170 LDA &71:JSR printhex2
```

In line 210 the contents of location &F has not yet been used (you can't normally use it anyway). It should be replaced with the constant #&F.

```
210 PLA:AND #&F
```

The CLS should be CLC in line 230.

```
230 CLC:SBC #9:BPL letter
```

The calls in the two lines below should be to &FFEE (*oswrch*) not &FFE7 (*osnewl*).

```
240 ADC #58:JMP &FFEE
260 ADC #64:JMP &FFEE
```

Again, in line 270 the square bracket is the wrong way around.

```
270 ]:NEXT:REPEAT
```

The wrong address is being called in line 310. It should read:

```
310 CALL &C00:PRINT " in hexadecimal"
```

To keep the REPEAT...UNTIL loop going indefinitely the TRUE should be changed to FALSE in line 320.

```
320 PRINT:UNTIL FALSE
```

It is helpful, especially in longer programs, to avoid using memory addresses such as &70 and &71 directly. This makes it easier when you come to de-bugging. So, if you give these addresses labels such as *lobyte* and *hibyte* your listings become clearer.

Also, references to operating system routines such as *oswrch* and *osnewl* should be made by name, if possible, to avoid confusion.

Checksum converter

Peter Davidson presents a novel approach to the Get it Right! routine

SEVERAL people have written to *The Micro User* saying that, as each line has a unique Get it Right! checksum, why can't we publish a utility to convert checksums into listings?

Well here it is – a short routine that allows you to enter those unique numbers and, once you have finished, converts them into a program using a complicated search, replace and decode algorithm.

Key in the program and use Get it Right! to ensure you have made no typing errors. Once you're sure it's correct save it and run it.

You are prompted for the checksums. Enter them, and when they are all keyed in type Return on its own.

To allow you to see the program in action quickly, here are the checksums for a routine that gives the day of the month, given the date:

```
5A9E
3899
1F9E
E78A
6A9B
098C
4AF
298
2AF8
6E99
```

Key them in at the prompt and I'm sure you'll be surprised with the result.

```
   10 REM Programmed Checksums
   20 REM by Pete Davidson
   30 REM (c) The Micro User
   40 MODE7:REM ---------------
   50 PRINT"Checksum to Basic Converter"
   60 PRINT"---------------------------"
   70 PRINT:PROCassem:I%=0
   80 REPEAT I%=I%+1:READ I%?&70,I%?&80
   90 UNTIL I%?&70=0:?&70=I%-1
  100 PROCinput:PROCoutput:END
  110 DEF PROCinput
  120 PRINT"Enter the checksums and"
  130 PRINT"just RETURN when finished"
  140 PRINT
  150 REPEAT INPUT"Next checksum",A$
  160 B$=B$+A$:UNTIL A$="":ENDPROC
  170 DEF PROCoutput:FOR I%=1 TO LENB$
  180 A%=ASCMID$(B$,I%):CALL decod:NEXT
  190 PRINT:ENDPROC
  200 DATA 66,12,53,65,51,80,49,82,55,73
  210 DATA 54,76,65,32,52,70,50,79,0,0
  220 DEF PROCassem:DIM Q% 100
  230 oswrch=&FFEE:base=&70:read=&80
  240 FOR L%=0 TO 2 STEP 2
  250 P%=Q%:[OPT L%:.decod LDX base
  260 .entry CMP base,X:BNE loop
  270  LDA read,X:JMP fin:.loop DEX
  280  BNE entry:RTS:.fin JMP oswrch
  290 ]:NEXT:ENDPROC
```

Get it right!

```
 10 =    0 0|110 = 4F14 8|210 = 2DF7 C
 20 =    0 0|120 = 9D86 E|220 = 9777 F
 30 =    0 0|130 = 44AA 0|230 = 67F9 7
 40 = 5BDB B|140 = FF3E 4|240 = AAB9 7
 50 = 8C93 B|150 = 81A5 3|250 = BD6D 5
 60 = D4F4 5|160 = A517 C|260 =  C2F E
 70 = B9A3 B|170 = 740D 5|270 = B273 5
 80 = A4B4 3|180 =  B46 7|280 = 4D47 C
 90 = 7FFA 7|190 = D333 1|290 = 953B 4
100 = 39E5 F|200 =  904 2|
```

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HyperDriver is an amazing new companion ROM for all Epson-compatible printers, unleashing all their capability, without resort to complex programming and arcane lists of numbers. Over eighty (yes 80!) star commands provide *all* printer functions. As well as all the standard FX80 commands, your own macros may be built. For example, one customer uses these for colour codes on his Integrexprinter. For VIEW, a special printer driver is provided in the ROM, which provides a unique and invaluable on-screen preview facility, which is available from BASIC as well, and yes, microspacing is at last supported! If you haven't got an NLQ font, don't worry, a beautiful proportional NLQ typeface is built into the ROM. Also you may print using the BBC Micro character set, including any characters you have defined. **HyperDriver** costs just **£29.95** for the 16k ROM, utilities and examples disc, and comprehensive 100-page manual. (Full data sheet on request).

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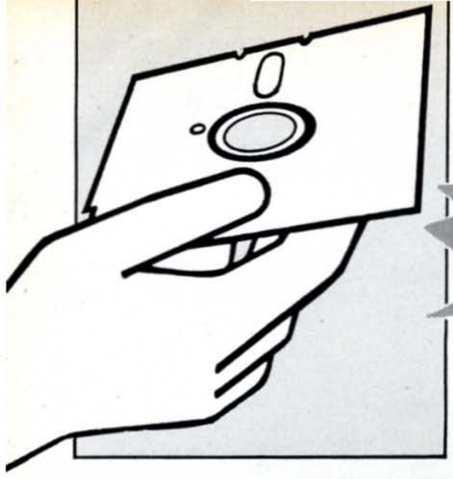

ZAP that disc!

A handy utility by Rob Anderson to edit DFS and ADFS discs

A DISC sector editor enables the contents of a disc to be examined and altered if desired. This facility can be used for salvaging data from a corrupt disc or altering a file's contents – or parameters such as filename and length – directly on the disc. It also helps you understand how the DFS or ADFS filing system works.

You can access an Acorn DFS – 40 or 80 track – or ADFS – small, medium or large – disc and compatible disc filing systems. One sector at a time is displayed on a Mode 7 screen and you can single step through the disc or jump directly to the required part.

Contents can be altered by entering hexadecimal or Ascii characters.

If you are editing sectors 0 or 1 of track 0 on an ADFS disc – the free space map – the program can be prompted to re-calculate the correct checksum which will be incorrect if these sectors are changed.

The program works on a Master 128 and BBC B, and is 6502 second processor compatible.

There are two front panels to the system: The menu and the edit mode. The former shows what functions the various keys perform, and the number of options available.

By pressing the 1 key or an asterisk you can enter an operating system command which enables you to select the correct filing system and specify the drive. Note that while you can enter any OS command here, take care not to issue commands likely to corrupt the program such as *COMPACT.

Option 2 provides a means of jumping directly to the required area of the disc. A prompt will ask for the track and sector number to be accessed, after which a verification check is made on this input to make sure that such an area exists. If everything is all right the edit panel is entered, otherwise the program complains and the menu panel is redisplayed. The exit option returns control to Basic.

The Tab key toggles between the edit and menu panels. Pressing it in the menu will result in the currently selected sector – or sector 0 on track 0 by default – being loaded into memory, and then the edit panel is entered if no errors are reported by the program.

Once you have entered the edit panel – either by pressing Tab or using the jump facility – the current sector is displayed. Various information is also displayed, including the current filing system and details of the type of disc currently in the drive.

This information is revised every time you access the edit panel, so it is quite feasible to be accessing an ADFS disc on drive 1 and then go into the menu panel, type *DISC, and re-enter the edit panel upon which editing can be carried out on the DFS disc in drive 0.

The arrow keys move the byte cursor around the screen display of the current sector. You can alter these bytes by either typing Ascii characters or by entering hexadecimal codes for them.

The byte cursor always points at the hexadecimal representation of the sector contents, but the character equivalent is displayed to the right of the screen – unless it is not printable on a Mode 7 screen, in which case a dot is shown.

You can select the two input modes by pressing Control+A for Ascii and Control+H for hexadecimal. Note that when you are in Ascii mode the byte cursor is automatically moved along to the next byte after you have typed a character which makes text entry much easier.

By holding Shift down, you can access a different sector or track as follows:

Shift+right	Move to the next sector
Shift+left	Move to the previous sector
Shift+up	Move to the next track
Shift+down	Move to the previous track

Any attempts to access sectors that do not exist will be stopped, and pressing Shift+Copy will save the sector back to disc, including any alterations that you may have made to it.

There may be problems trying to access a corrupted disc. If the directory sectors are at fault you can usually rectify this by using the editor to poke

Notes for ADFS users

If the ADFS filing system is active the disc editor will adjust accordingly and display the disc size: 40 tracks is small, 80 tracks is medium and 160 tracks is large. The current track and sector numbers are also shown but the absolute sector number is not displayed due to a preference for relative ones with this system. You can easily work this out using the formula:

absolute number=track*16+sector

If you ever carry work out on sectors 0 or 1 of track 0 a prompt will be displayed asking if the correct checksum should be included at the end of the sector when you save it to disc. In most cases the reply should be Y for yes so that the dreaded Bad FS map *error is not generated when the ADFS senses that bytes have been changed.*

This error can also be generated by nonsense data in the free space maps, such as when the number of free sectors added to the number of used sectors does not equal the total number of sectors on the disc.

If a disc already has the error you can usually correct it by using the disc editor to load and save sector 0 and 1 of track 0, allowing the program to re-calculate the checksum.

If problems still occur they will probably be due to nonsense data and may be sorted out by working through the bytes to see that they contain feasible values.

*To access a bad FS map disc with the editor, type *FADFS and *MOUNT 0 in the menu section rather than *ADFS which you would normally use to access a good ADFS disc. Then press Tab and track 0 sector 0 should be displayed to allow you to make the required changes.*

values directly to the disc. The track and sector range checks will always allow you to access track zero, sector zero or one – even if the catalogue entry says the disc has –54 sectors. On both the DFS and ADFS this area contains the disc size, so you can enter new correct values, which will enable you to access the rest of the disc.

For details concerning how sector memory is allocated, see the Acorn Disc System User Guide or the Master Reference Manual part 1.

Technical Details

The program is written in Basic, along with a little section of machine code to generate the free space checksum if required. Page can take any reasonable value.

The following operating system routines are used, and you can find full details in the Master reference manual part one.

Various legal zero page locations are used for temporary storage – &70 to &8F.

Mnemonic	Call address	Accumulator	Use
OSGBPB	&FFD1	6	To read the current DFS drive number.
OSARGS	&FFDA	0	Used with Y=0 to obtain the currently active filing system.
OSWORD	&FFF1	114	Used to read or write an ADFS sector.
		126	Provides an easy way of obtaining the current DFS disc size.
		127	Used to read or write a DFS sector.

```
  10 REM DISC SECTOR EDITOR
  20 REM By Rob Anderson
  30 REM (c) The Micro User
  40 ONERRORPROCerror
  50 MODE7
  60 DIMsecmem% 256,I$(1),code% 50
  70 PROCinitial
  80 REPEAT
  90 VDU26,12
 100 PROCcentre(title$,0):PROCcentre(ti
tle$,1)
 110 VDU28,0,24,39,3
 120 REPEAT
 130 CLS:RESTORE270
 140 FORA%=2TO4:READA$
 150 PRINTTAB(0,A%)CHR$131CHR$(A%+47)")
"CHR$134A$
 160 NEXT
 170 PRINT'CHR$131"TAB "CHR$134"toggle
menu / edit mode."''CHR$131"EDIT MODE K
EYS;"'CHR$134"Cursor keys - move byte cu
rsor."'CHR$134"SHIFT+left & right - acce
ss sector."'CHR$134"SHIFT+up & down - ac
cess track."
 180 PRINTCHR$134"CTRL A/H - ASCII/HEXA
DECIMAL entry."'CHR$134"SHIFT+COPY - sav
e sector to disc."
 190 opt%=GET
 200 IFopt%=49ORopt%=42PROCos
 210 IFopt%=50PROCjump:opt%=9
 220 UNTILopt%=9ORopt%=51
 230 IFopt%<>51 PROCeditpanel
 240 UNTILopt%=51
 250 MODE7:*FX4,0
 260 END
 270 DATA Operating system command (or
*).,Jump to track / sector.,Exit.
 280:
 290 DEFPROCinitial
 300 PROCass
 310 @%=&3:I%=0:osgbpb=&FFD1:osargs=&FF
DA:osword=&FFF1
 320 title$=CHR$141+CHR$132+CHR$157+CHR
$131+"DISC SECTOR EDITOR  "+CHR$156
 330 sector%=0:track%=0
 340 I$(0)="ASCII       ":I$(1)="hexadec
imal"
 350 *FX4,1
 360 ENDPROC
 370:
 380 DEFPROCeditpanel
 390 LOCALopt%
 400 file$=FNfilesystem:IFfile$="X"ENDP
ROC
 410 IFfile$="ADFS"maxsector%=15:PROCge
tsec(0,0):maxtrack%=((secmem%?252)+(secm
em%?253)*256)/16-1 ELSEIFfile$="DFS" A%=
6:X%=&70:Y%=0:!&71=secmem%:CALLosgbpb:dr
ive%=?(secmem%+1)-48:maxsector%=9:A%=&7E
:X%=&70:Y%=0:CALLosword:maxtrack%=!&70/&
19000*40-1
 420 IFtrack%>maxtrack%ANDtrack%<>0PRIN
TCHR$131CHR$136CHR$7"TRACK RANGE ERROR,
maximum is ";maxtrack%:A%=FNanykey:track
%=0:ENDPROC
 430 IFsector%>maxsector%ANDsector%<>0A
NDsector%<>1PRINTCHR$131CHR$136CHR$7"SEC
TOR RANGE ERROR, maximum is ";maxsector%
:A%=FNanykey:sector%=0:ENDPROC
 440 VDU26,12
 450 PRINTCHR$131"TRACK"CHR$134;track%T
AB(15)CHR$131"SECTOR"CHR$134;sector%;
 460 IFfile$="DFS"PRINTTAB(27)CHR$131"D
RIVE"CHR$134;drive%ELSEPRINT
 470 PRINTCHR$131"Filing system:"CHR$13
4file$" (";:IFfile$="DFS"PRINT;maxtrack%
+1;" track";ELSEIFfile$="ADFS"ANDmaxtrac
k%=39PRINT"small";
 480 IFfile$="ADFS"ANDmaxtrack%=79PRINT
"medium";ELSEIFfile$="ADFS"ANDmaxtrack%=
159PRINT"large";
 490 PRINT")."'CHR$131"Input:"CHR$134;I
$(I%)
 500 VDU28,0,24,39,4
 510 PROCgetsec(track%,sector%)
 520 PROCshowsec
 530 REPEAT
 540 opt%=GET
 550 *FX15,0
 560 IFopt%=137ANDINKEY(-1)ANDsector%+1
<=maxsector% sector%=sector%+1:VDU26:PRI
NTTAB(23,0);sector%;"  ":VDU28,0,24,39,4
:PROCgetsec(track%,sector%):PROCshowsec:
opt%=0
 570 IFopt%>31ANDopt%<127ANDI%=0 PRINTT
AB(x%+1,7);~opt%;TAB(29+x%DIV3,7-
)CHR$opt
%;:secmem%?P%=opt%:opt%=137
 580 IFopt%<48ORopt%>57ANDopt%<65ORopt%
>70GOTO610
 590 secmem%?P%=secmem%?P%*16+EVAL("&"+
CHR$(opt%)):A%=secmem%?P%:IFA%<16A$=" "E
LSEA$=""
 600 PRINTTAB(x%+1,7);A$;
A%;:IFA%>31AN
DA%<127ORA%>159ANDA%<256 PRINTTAB(29+x%D
IV3,7)CHR$A%;ELSEPRINTTAB(29+x%DIV3,7)".
";
 610 IFopt%=136ANDINKEY(-1)ANDsector%>0
 sector%=sector%-1:VDU26:PRINTTAB(23,0);
sector%;"  ":VDU28,0,24,39,4:PROCgetsec(
track%,sector%):PROCshowsec:opt%=0
 620 IFopt%=139ANDINKEY(-1)ANDtrack%<ma
xtrack% track%=track%+1:VDU26:PRINTTAB(7
,0);track%;"   ":VDU28,0,24,39,4:PROCget
sec(track%,sector%):PROCshowsec:opt%=0
 630 IFopt%=138ANDINKEY(-1)ANDtrack%>0t
rack%=track%-1:VDU26:PRINTTAB(7,0);track
%;"   ":VDU28,0,24,39,4:PROCgetsec(track
%,sector%):PROCshowsec:opt%=0
 640 IFopt%<>136ORP%=0GOTO670
 650 PROCnoarr:P%=P%-1:x%=x%-3:IFx%=3 x
%=27:PROCmovedown
 660 PROCarrow
 670 IFopt%<>137ORP%=255GOTO700
 680 PROCnoarr:P%=P%+1:x%=x%+3:IFx%=30x
%=6:PROCmoveup
 690 PROCarrow
 700 IFopt%=138ANDP%<&F8 PROCnoarr:P%=P
%+8:PROCmoveup:PROCarrow
 710 IFopt%=139ANDP%>7 PROCnoarr:P%=P%-
8:PROCmovedown:PROCarrow
 720 IFopt%=1ORopt%=8I%=opt%DIV8:PRINTC
HR$26TAB(8,2)I$(I%):VDU28,0,24,39,4
 730 IFopt%=135ANDINKEY(-1)PROCputsec
 740 UNTILopt%=9
 750 ENDPROC
 760:
 770 DEFPROCnoarr
 780 PRINTTAB(x%,7)" ";TAB(x%+3,7)" ";
 790 ENDPROC
 800:
 810 DEFPROCarrow
 820 PRINTTAB(x%,7)"]";TAB(x%+3,7)"[";
 830 ENDPROC
 840:
```

This listing – plus an Archimedes version – can be found on this month's *Micro User* disc. See the order form on Page 159.

***Turn to Page 114* ▶**

◄ From Page 113

```
  850 DEFPROCmoveup
  860 VDU31,0,20
  870 A%=P%DIV8*8+104
  880 IFA%>&F8 PRINT:ENDPROC
  890 PRINT'CHR$131~A%DIV8*8;CHR$135,;
  900 FORB%=secmem%TOsecmem%+7:PRINT
B%?
A%,;:NEXT
  910 PRINT" ";
  920 FORB%=secmem%TOsecmem%+7
  930 IFB%?A%>31ANDB%?A%<127ORB%?A%>159A
NDB%?A%<256PRINTCHR$(B%?A%);ELSEPRINT"."
;
  940 NEXT
  950 ENDPROC
  960:
  970 DEFPROCmovedown
  980 VDU30
  990 A%=P%DIV8*8-56
 1000 IFA%<0 VDU11:ENDPROC
 1010 VDU30;11;131
 1020 PRINT~A%DIV8*8CHR$135,;
 1030 C%=6:FORB%=secmem%TOsecmem%+7:PRIN
TTAB(C%,0)~B%?A%;:C%=C%+3:NEXT
 1040 PRINT" ";
 1050 FORB%=secmem%TOsecmem%+7
 1060 IFB%?A%>31ANDB%?A%<127ORB%?A%>159A
NDB%?A%<256PRINTCHR$(B%?A%);ELSEPRINT"."
;
 1070 NEXT
 1080 ENDPROC
 1090:
 1100 DEFFNfilesystem
 1110 A%=0:Y%=0:F%=USR(osargs)AND&FF:IFF
%=8 ="ADFS" ELSEIFF%=4 ="DFS" ELSE PRINT
CHR$131CHR$136CHR$7"BAD FILING SYSTEM":A
%=FNanykey:="X"
 1120:
 1130 DEFPROCcentre(A$,Y%)
 1140 PRINTTAB(18-LENA$/2,Y%);A$;
 1150 ENDPROC
 1160:
 1170 DEFPROCos
 1180 CLS:PRINTCHR$131"Enter O.S. comman
d;"
 1190 REPEAT
 1200 INPUT"*"A$:OSCLI(A$):A$=CHR$(FNany
key)
 1210 UNTILA$<>"*"
 1220 ENDPROC
 1230:
 1240 DEFPROCjump
 1250 CLS
 1260 PRINTCHR$131"Enter track number;":
INPUTtrack%
 1270 PRINTCHR$131"Enter sector number;"
:INPUTsector%
 1280 ENDPROC
 1290:
 1300 DEFPROCgetsec(T%,S%)
 1310 IF file$="DFS" ?&70=drive%:!&71=se
cmem%:?&75=3:?&76=&53:?&77=T%:?&78=S%:?&
79=33:X%=&70:Y%=0:A%=&7F:CALLosword:PROC
dfserror:ENDPROC
 1320 IF file$="ADFS" ?&70=0:!&71=secmem
%:?&75=&08:?&76=0:abssec%=T%*16+S%:?&77=
abssec%DIV256:?&78=abssec%MOD256:?&79=1:
X%=&70:Y%=0:A%=&72:CALLosword:PROCadfser
ror
 1330 ENDPROC
 1340:
 1350 DEFPROCputsec
 1360 IF file$="DFS" ?&70=drive%:!&71=se
cmem%:?&75=3:?&76=&4B:?&77=track%:?&78=s
ector%:?&79=33:X%=&70:Y%=0:A%=&7F:CALLos
word:PROCdfserror:ENDPROC
 1370 IFtrack%=0ANDsector%=0ORsector%=1
VDU26:PRINTTAB(0,3)CHR$131CHR$7CHR$136"R
e-calculate checksum?(Y/N)";:IFGET<>78 C
ALLchecksum
 1380 VDU26:PRINTTAB(0,3)STRING$(39," ")
;:VDU28,0,24,39,4:PROCshowsec
 1390 ?&70=0:!&71=secmem%:?&75=&0A:?&76=
0:abssec%=track%*16+sector%:?&77=abssec%
DIV256:?&78=abssec%MOD256:?&79=1:!&7B=25
6:X%=&70:Y%=0:A%=&72:CALLosword:PROCadfs
error
 1400 ENDPROC
 1410:
 1420 DEFPROCshowsec
 1430 CLS:P%=-8:PRINTTAB(0,6);
 1440 FORA%=secmem%TOsecmem%+104STEP8
 1450 P%=P%+8:PRINT'CHR$131
P%;CHR$135,;
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
 1460 FORB%=A%TOA%+7:PRINT~?B%,;:NEXT
 1470 PRINT" ";
 1480 FORB%=A%TOA%+7
 1490 IF?B%>31AND?B%<127OR?B%>159AND?B%<
256PRINTCHR$(?B%);ELSEPRINT".";
 1500 NEXT,
 1510 PRINTTAB(6,7)"]"TAB(9,7)"["
 1520 x%=6:P%=0
 1530 ENDPROC
 1540:
 1550 DEFFNanykey
 1560 PRINTCHR$131"Press any key;":=GET
 1570:
 1580 DEFPROCerror
 1590 PRINT'CHR$7CHR$136CHR$131"ERROR:"C
HR$135;:REPORT:PRINT:A%=FNanykey:RUN
 1600:
 1610 DEFPROCdfserror
 1620 RESTORE1660:IF?&7A=0ENDPROC
 1630 REPEAT:READA$,A%:UNTILA%=?&7AORA%=
1
 1640 CLS:PRINT'CHR$7CHR$131CHR$136"DISC
 ERROR;"'CHR$134A$:A%=FNanykey:RUN
 1650 ENDPROC
 1660 DATA Cyclic redundancy error (ID),
12,Cyclic redundancy error (data),14,Tra
ck 0 not found,20,Write fault,22,Sector
not found,24,Unknown,1
 1670:
 1680 DEFPROCadfserror
 1690 RESTORE1730:IF?&70=0ENDPROC
 1700 REPEAT:READA$,A%:UNTILA%=?&70ORA%=
1
 1710 CLS:PRINT'CHR$7CHR$131CHR$136"DISC
 ERROR;"'CHR$134A$:A%=FNanykey:RUN
 1720 ENDPROC
 1730 DATA Cyclic Redundancy check error
,72,Sector not found,80,Bad command,96,B
ad address,97,Volume error,99,Bad drive,
101,Unknown,1
 1740:
 1750 DEFPROCass
 1760 FORpass=0TO2STEP2
 1770 P%=code%
 1780 [OPTpass
 1790 .checksum
 1800 LDA#secmem%DIV256:STA&71:LDA#secme
m%MOD256:STA&70:LDA#&FF:LDY#&FE:CLC
 1810 .add:ADC(&70),Y
 1820 PHP:DEY:CPY#&FF:BEQout
 1830 PLP:JMPadd
 1840 .out:PLP:STA(&70),Y
 1850 RTS:]:NEXT
 1860 ENDPROC
```

Get it right!

```
  10 =    0 0 | 320 = C5B0 D | 630 = BC5A 0 |  940 = 2C83 C | 1250 = 7A16 7 | 1560 = D54F 1
  20 =    0 0 | 330 = B6D1 F | 640 = A6CA 8 |  950 = ED0F 0 | 1260 =  D21 3 | 1570 = 9719 B
  30 =    0 0 | 340 = 35F2 B | 650 = 24D4 2 |  960 = 9719 4 | 1270 = 4960 F | 1580 = D7A7 3
  40 = 40B5 5 | 350 = E383 7 | 660 = A560 3 |  970 = 708B 1 | 1280 = ED0F D | 1590 = F0B9 1
  50 = 8AFC E | 360 = ED0F 2 | 670 = 5F28 A |  980 = EA95 7 | 1290 = 9719 E | 1600 = 9719 0
  60 = 9AA9 E | 370 = 9719 5 | 680 = E684 D |  990 = 5914 E | 1300 = 2ED8 4 | 1610 = 2524 F
  70 = 2CA9 5 | 380 = 6B55 5 | 690 = A560 A | 1000 = 4955 0 | 1310 = 803C 9 | 1620 = EBEB 5
  80 = BFBA 1 | 390 = 98CC A | 700 = AB21 3 | 1010 =  EEE 1 | 1320 = BB5F 4 | 1630 = ADAE D
  90 = DE34 E | 400 = D302 B | 710 =  307 4 | 1020 = 7CDF 3 | 1330 = ED0F 4 | 1640 = 7AC4 7
 100 = 1CA5 C | 410 = 6C75 E | 720 = CDF5 0 | 1030 = C09B 1 | 1340 = 9719 7 | 1650 = ED0F C
 110 = 7B51 B | 420 = 5106 C | 730 = 55C4 A | 1040 = 2E5B 7 | 1350 = F571 B | 1660 = 88D3 F
 120 = BFBA 0 | 430 = 63C4 F | 740 = 730E D | 1050 = BD6A 0 | 1360 = 56AA A | 1670 = 9719 6
 130 = EBDB 1 | 440 = DE34 8 | 750 = ED0F C | 1060 = 478F 1 | 1370 = 9E73 D | 1680 = 3852 2
 140 = 2C1B 0 | 450 = D998 A | 760 = 9719 1 | 1070 = 2C83 6 | 1380 = B2A2 2 | 1690 = 1DB7 1
 150 = 2DE8 F | 460 = C09B D | 770 = 7665 0 | 1080 = ED0F D | 1390 = 28B6 8 | 1700 = AD92 3
 160 = 2C83 3 | 470 = 8BBD C | 780 = 6980 B | 1090 = 9719 6 | 1400 = ED0F 6 | 1710 = 7AC4 6
 170 = 2C72 0 | 480 = 707A 5 | 790 = ED0F 5 | 1100 = D9FF C | 1410 = 9719 8 | 1720 = ED0F 1
 180 = 4979 D | 490 = 5DA5 A | 800 = 9719 6 | 1110 = CEBD 1 | 1420 = 670B E | 1730 = C94C 2
 190 = F4A9 8 | 500 =  BB6 5 | 810 =  E04 1 | 1120 = 9719 E | 1430 =  CA3 4 | 1740 = 9719 4
 200 = EF44 A | 510 = A605 4 | 820 = AAE5 0 | 1130 = 3604 B | 1440 = 109B 0 | 1750 = DB18 E
 210 = FD7C E | 520 = 8AAD 8 | 830 = ED0F F | 1140 = F2D8 F | 1450 = 8E09 F | 1760 = C134 A
 220 = 801F 0 | 530 = BFBA 4 | 840 = 9719 A | 1150 = ED0F 9 | 1460 = DF85 5 | 1770 =   7B D
 230 = 8E33 6 | 540 = F4A9 A | 850 = DEC8 9 | 1160 = 9719 0 | 1470 = 2E5B 7 | 1780 = 5BBE 7
 240 = 23EB C | 550 = 6C86 F | 860 = 4BAD 8 | 1170 = 4957 9 | 1480 = A5C6 6 | 1790 = D6D4 5
 250 = 9B89 9 | 560 = 214D 9 | 870 = F8F4 4 | 1180 =  4B5 8 | 1490 = 7700 B | 1800 = A9FD 9
 260 = FD2E 8 | 570 = 5C59 2 | 880 = 9986 4 | 1190 = BFBA B | 1500 = 8300 C | 1810 = E2DD 3
 270 = 6C62 9 | 580 = ED8C 4 | 890 = C32A 1 | 1200 = FDEA 4 | 1510 = 5E5F 3 | 1820 = 7E38 1
 280 = 9719 0 | 590 = D6C4 5 | 900 = B4D6 F | 1210 = 4110 F | 1520 = B7CF 4 | 1830 = 834E 3
 290 = C10F 9 | 600 = D50A 3 | 910 = 2E5B 1 | 1220 = ED0F E | 1530 = ED0F C | 1840 = 8819 6
 300 = CD80 A | 610 = D4DB 0 | 920 = BD6A 9 | 1230 = 9719 C | 1540 = 9719 3 | 1850 = 99A1 7
 310 = 5D8E E | 620 = 9D0A 5 | 930 = 478F 8 | 1240 = 9042 9 | 1550 = 697D 8 | 1860 = ED0F 4
```

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● with Green Monitor	£885
● with Colour Monitor	£1035
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● with Green Monitor	£1449
● with Colour Monitor	£1599
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● with Green Monitor	£2349
● with Colour Monitor	£2499

(Securicor carr. £7 on Micros)

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*For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at **0% (APR)** finance. Credit facility available subject to status. Please inquire for further details.*
(Watford Electronics are Licenced Credit Brokers)

NEW

CREDIT TERMS now available. Please telephone or write in for further information.

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with two disks, one 5.25" for the BBC, the other 3.5" format for the Archimedes, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

Only £25

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. Upto FOUR drives can be connected and NO SOLDERING is involved. Supplied complete with necessary lead.

Only £25

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Archimedes.

Archimedes Printer Lead	£8.50
Archimedes Monitor Lead	£7.50

BBC MASTER

BBC MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL **£379**

SPECIAL OFFER

FREE . . . £105 worth of Hardware & Software

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** 3½", double sided 1 Megabyte (unformatted) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

BBC MASTER with Turbo Board + above SPECIAL OFFER	**£475**
512K Processor Add on Board "inc. Mouse and GEM package"	£185
BBC AIV (Domesday) System	£4479

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£95
Econet Module for the Master	£40
Twin ROM Cartridge for Master	£7.50
Quad ROM Cartridge for Master	£12
Universal Processor Adaptor	£75
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref. Manual	(No VAT)£19
64K Upgrade Kit for B+	£32
Acorn 1770 DFS Kit complete	£41
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BBC MASTER COMPACT

All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled software.

System 1	Standard Package	£310
System 1A	System 1 + TV Modulator	£322
System 2	System 1 + Green Hires Monitor	£364
System 3	System 1 + Medium Res Colour Monitor	£478
RS232 Kit for BBC Compact		£25
Additional 3½" Drive for BBC Compact		£90

(Securicor carriage £7)

Watford Electronics are the main Approved Stockist of ACORN SPARES and ECONET Referral Centre

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

65C102 2nd PROCESSOR

(65C102 replaces the original Acorn 6502 2nd Processor)

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

£135

Z88 Sinclair's Portable Micro

Price:£239

FREE

As an introductory offer, we are giving away, 4 rechargeable batteries and a compact Mains Battery Charger absolutely FREE with every Z88 bought from us this this month.

ACCESSORIES

Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
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Z88 BBC or PC Link	£21.70
Z88 EPROM ERASER	£34.75
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Z88 Modem	£86.90
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SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £3.00
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27128-250nS (21V) £4.25

RAMs (Low power) for ATPL, WATFORD, etc.,
Sideways ROM Boards

6264LP (8K) £2.75
2 × 6264LP (16K) £5.30

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£35 (carr £5)

NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual, taking components from the library and connecting them, or highly automatic starting from a netlist and list of components. In auto mode, PCB Designer will never allow you to forget a connection again! And of course, either in manual or auto mode, connectivity is maintained no matter how you later move the parts around and route the tracks. Connections snap together and angles are corrected, Through hole vias and track thickness are established automatically and many more features, far too numerous to mention here, are included in the system.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

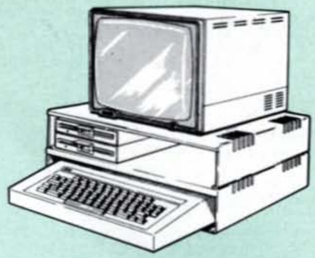
BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

Introductory Offer: £99

(Please write in for further technical details)

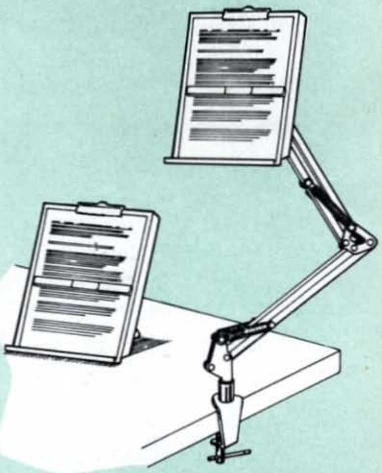
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued →

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

● 1431 – Standard resolution as used on the BBC television computer programme	**£175**
● 1451 – Medium resolution, suitable for word processing in mode 0	**£225**
● 1441 – High res, exceeds the capabilities of the BBC micro	**£359**
● 1431AP RGB + PAL and AUDIO	**£199**
● 1451AP RGB + PAL and AUDIO	**£255**
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● **2040 CS 20" Hi Res**	**£675**
● Dust Cover for Microvitecs	**£5.50**
● Touchtec 501 Touch Screen	**£239**

TAXAN 12" & 14"

● **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing	**£269**
● **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue	**£319**
● **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes	**£449**
● **NEC JC-1401P3EE 14"** Multisnc Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor.	**£495**

- **Philips BM7542 12" Paper White Monitor.**
  Attractively finished high res monitor. Has an etched glass anti-glare screen and a tilt stand for optimum viewing angle. 1000 x 850 pixels resolution coupled with high contrast makes it ideal for both word pro and graphics. The paper white display is ideal for DTP and CAD. Has a Video/Audio input. **Only £69**

STAR BUY

- **PHILLIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

ZENITH

"Now Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Sys.)

● **Green (New Design) Hi-resolution**	**£66**
● **Amber (New Design) Hi-resolution**	**£70**

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**

SWIVEL BASES

for Video Monitors

Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12" Monitors **£9** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks. **£12**

Acorn-Olivetti JP101 Ink Jet Printer

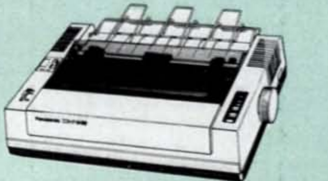
One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**
(Offer valid while present stocks last)

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

Pack of 4 refills **£10**

Screen Dump ROM for JP101 £12

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£149** (carr. £6)
Optional RS232 Interface: **£39**

Panasonic KX-P1082

This superb printer is very similar to the popular KX-P1081 printer but at 160 cps (40 cps in NLQ), a lot faster.

(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: **£175** (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£239** (carr. £7)

Single Sheet Feeder	**£175**
Tractor Feed	**£90**

FREE 32K extra Printer Buffer with every KX-P3131 purchased from us this month.

NEC P2200 PINWRITER

24 pin head; 168 CPS, LQ 56 CPS, 8K Buffer, Tractor/Friction feed. Numerous typefaces. **£285**

Cut Sheet Feeder **£59**

NEC P660 PINWRITER

24pin; 216 CPS, LQ 76 CPS, 8K Buffer **£425**

VARIOUS PRINTERS & ACCESSORIES

● Brother HR15 RS232 Daisy Wheel	**£275**
● Brother HR20 Daisy Wheel	**£349**
● Epson EX800 Printer	**£395**
● Epson EX1000 Printer	**£539**
● Epson FX800 Printer	**£295**
● Epson FX1000 Printer	**£399**
● Epson LQ800 Printer	**£399**
● Epson LQ850 Printer	**£439**
● Epson LQ1050 Printer	**£529**
● Epson LQ2500+ Printer	**£790**
● Epson LX800 Printer	**£186**
● Epson SQ2500 Printer	**£899**
● Epson Paper Roll Holder	**£17**
● EX800/1000 Colour Option	**£55**
● EX800/1000 Colour Ribbon	**£18**
● EX800 Cut Sheet Feeder	**£130**
● EX1000 Cut Sheet Feeder	£195
● FX/LQ/LX800 Single Sheet Feeder	**£135**
● FX/LQ1000 Single Sheet Feeder	**£169**
● Hi-80 Refills – Set of 4 Pens	**£7**
● LX800 Cut Sheet Feeder	**£75**
● LQ800 Tractor Feed	**£44**
● LQ1000 Tractor Feed	**£50**
● LQ2500 Cut Sheet Feeder	**£195**
● LX1000 Cut Sheet Feeder	**£305**
● **Hitachi 672 Colour Plotter**	**£475**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	**£249** (carr £7)
Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

INTEGREX COLOUR JET PRINTER

● Colour Jet 132 Printer	**£525**
● Paper Roll	**£6**
● Screen Dump Software	**£10**
● Colour Cartridge	**£14**
● Black Cartridge	**£8**
● 100 A4 OHP transparencies	**£55**

PRINTER SHARERS

(Ideal for School environment)

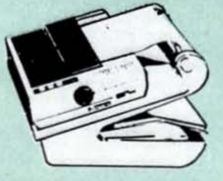
Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£27
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26 **(carr. £2.50)**

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**
Compact's Special Centronics Lead	**£9**
RS232 Cable	**P.O.A.**
IBM Parallel 1 metre Cable	**£9**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	**Ribbons**	**Dust Covers**
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£7.00	–
Kaga/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9½" × 11" Fanfold Paper	**£7**
2,000 Sheets 9½" × 11" Fanfold Paper	**£12**
1000 Sheets 9½" x 11" NCR 2 Part Fanfold	**£19**
1,000 Sheets 15" × 11" Fanfold Paper	**£9**
1000 Sheets true A4 Fanfold Paper	**£11**
2000 Sheets true A4 Fanfold Paper	**£20**
Teleprinter Roll (Econo paper)	**£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	**£5.00**
1,000 90 × 36mm (Twin Row)	**£4.90**
1,000 90 × 49mm (Twin Row)	**£7.50**
1,000 102 × 36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

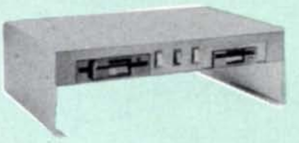
SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25 inch disk drive is 40/80 track switchable, and has its very own power supply running independently of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

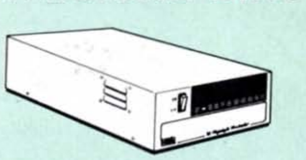
OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£139**

BBC Screen Dump	**£10**
Colour Ribbon	**£6**
Black Ribbon	**£6**

30 Megabyte Winchester Drive



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17" X disc interface).

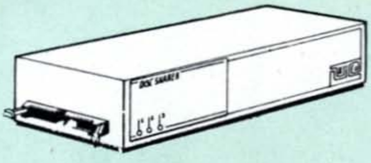
Launch Offer **£449** (Carr. £12)

At last, it's here! The Advance Reference Manual for the BBC Master

£19.95

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

Complete Disc Interface Kit including DFS ROM and fitting instructions	**£52**
Acorn's 0.90 DFS Kit complete	**£54**
DFS Manual (Comprehensive)	*(no VAT)* **£6.95**
(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).	
Watford's sophisticated DFS ROM only	**£16**
We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only	**£12**
DNFS ROM only **£17**	*ADFS ROM only* **£25**

- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

NEW

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

Special introductory offer	**£39.00**
DDFS Manual	(No VAT) **£6.95**
We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

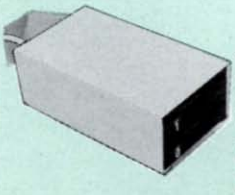
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

Single 400K Drive	**£69**
Twin 800K Drives	**£126**

Mysteries of disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

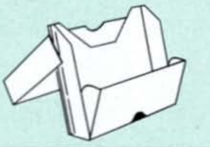
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 50 5¼" discs	**£6.00**
M85 – holds upto 95 5¼" discs	**£8.00**
M25* – holds upto 25 3½" Discs	**£5.50**
M50 – holds 50 3½" Discs	**£7.50**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20**	Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95**	Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

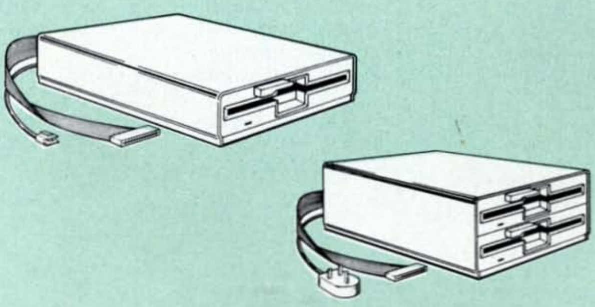
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £168	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £169		CD 800S £188

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes (744)*	***£8.00***
● *10 × 5¼" D/S D/D 40 Track Diskettes (745)*	***£9.75***
● *10 × 5¼" S/S D/D 80 Track Diskettes (746)*	***£12.50***
● *10 × 5¼" D/S D/D 80 Track Diskettes (747)*	***£12.75***
● *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT*	***£28***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£13.50***
● *10 × 3½" D/S D/D 40/80 track Discs*	***£15***

FREE This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise. Any of the above diskettes

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£15***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£6.50***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£8***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£9***
● *3" Double Sided Discs*	***£3** each*

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

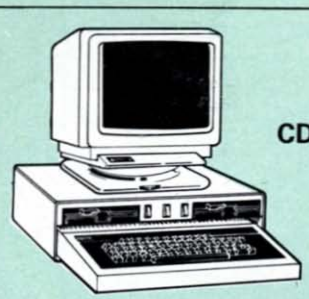
Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

PRICES SLASHED

WATFORD's WINCHESTER DRIVES

● 10 Megabyte Unit with ADFS	**£399**
● 30 Megabyte Unit with ADFS	**£449**
● 40 Megabyte Unit with ADFS	**£749**

CDP800S



CDPM800S

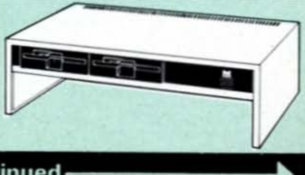
Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP £350

Our Price: Only £175
(carr £7)

Continued →

NOMINATED FOR
BRITISH MICRO COMPUTING AWARDS
1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87

". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."

"Quest Paint is a major leap forward in BBC programming. . ."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."

". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- Pick filenames off the screen for loading and saving.
- Rotate a cutout to any angle and Distort it to any four sided shape.
- Has Built in Font editor.
- Default brushes and patterns on startup.
- 16 x 16 font available on start up.
- Ability to reset patterns, fonts and brushes to default at any time.
- ROM based enhanced Epson and compatible printer dump.
- ROM based enhanced extended picture routine.
- Ability to create and abort extended pictures.
- Improved disk access speed for extended pictures.
- User definable sideways RAM driver for incompatible sideways RAM systems.
- Ellipses at any angle on Master 128 (or B with GXR ROM).

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***
GXR ROM for BBC Micro	***£22***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

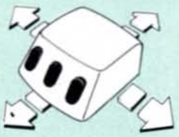
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	**£59**
RB2 including Quest Paint	**£85**

FLEET STREET EDITOR

Software pack for BBC Micro	**£31**
Software pack for the Master	**£39**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

THE NEW Mk III AMX MOUSE



ONLY: £59 **Inc. Super Art package**
(carr £1.50)
(Please specify for BBC, Master or Compact)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

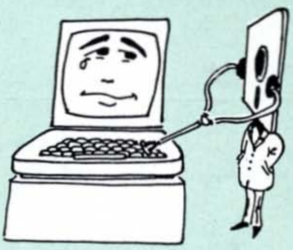
AMX MAT	£3
AMX MOUSE ONLY	£29
AMX DESK Package	£19
AMX UTILITY Package	£11
AMX SUPERART Package	£39
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£9.50

AMX DESIGN (ROM)	£59
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£19
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

Coming soon
WAPPING EDITOR

Watford Electronics brings the 'Freedom of Press' to your fingertips, with this most sophisticated DTP software ever written for the BBC range of Microcomputers.
Wapping Editor utilises the latest technology. 64K! PAL-PROM device to complement our range of QUEST MOUSE based software.
Contained within the PAL-PROM is all the software you require to publish your own newsletters and magazines:

- Mouse driven drawing package
- Wordprocessor
- Font designer
- Page make-up
- Page review
- In-built fonts

DRAWING PACKAGE

Imagine Quest Paint in mode 0 – this is it! Even if you are not considering publishing your own Newspaper, the Wapping Editor is worth having for this graphics facility alone! As with Quest Paint, the package may be used in conjunction with the Watford BEEB Video Digitiser. Features of this section include: Sophisticated Airbrush; Block copy; Move; Mirror & Rotate; User-definable brushes; Circles; Ellipses; Polygons; Fill and of course ultra-smooth flicker-free mouse movement.

WORD PROCESSOR

One feature which makes this package stand out is the inclusion of a versatile word processor. It is now no longer necessary to buy an additional wordprocessor before you can start publishing, although of course text may be taken from other Word processors like, View, Wordwise, Interword, Edward, etc.

FONT DESIGNER

This is the enhanced version of the highly acclaimed Font Designer in our ConQuest ROM. Unlike those in other DTP packages, the Wapping Editor's font editor allows redesign of ALL the keyboard characters – including the space! Special routines have been included to allow fonts from other DTP products to be loaded and re-saved in Wapping Editor format. This designer may also be used to create brush shapes for the drawing package.

PAGE MAKE-UP

At last page layout is no longer a chore. With this user friendly system, text and graphics can be positioned anywhere on the page with ease. Using the mouse, simply pull out a rectangle over the desired area of the page, specify the filename of the text or graphic to be used and click the mouse! With text, the typeface, justification and number of columns you require may also be specified.

PAGE REVIEW

A simple way to view any stored pages from the disc. Pages are shown in a condensed format allowing a whole page to be displayed on the screen.

IN-BUILT FONTS

In addition to being able to create your own fonts, several attractive and useful fonts are provided within the PAL-PROM itself. These are always available for use. No more frantic search for a 'font disc'!
Extensive use has been made of the mouse throughout, keeping keyboard entry to a bare minimum. Filenames for loading pictures, fonts, pages and text documents are picked off the screen with a single mouse click. The entire package is contained within the PAL-PROM, making 'system discs' unnecessary. Unlike some of its predecessors, the Wapping Editor allows you to store pictures, fonts, pages and text documents all on the same disc, greatly simplifying disc management.
Designed to run on the BBC B, B+ and Master series computers, this program will make use of any shadow or sideways RAM present. With Wapping Editor, DTP comes of age on the BEEB.
Don't settle for LESS, buy the BEST.

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety of styles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mode 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating and running 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

ENGLISH DICTIONARY
ROMSPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.
NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER

ROM
MANAGER
DFS
BEEBUG

Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

Continued →

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:		
	Aries B-12	**£40**
	Aries B-12C	**£5**

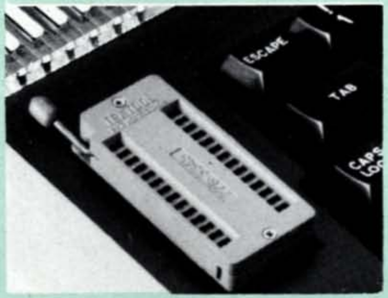
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

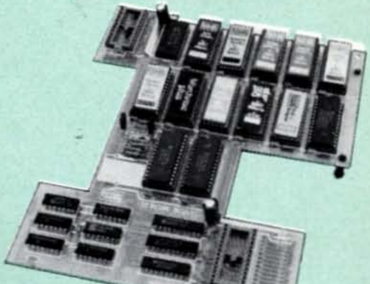
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£18** (carr £2)

Optional extras

READ and WRITE protect Switches	**£2** each
Battery for Battery Backup	**£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

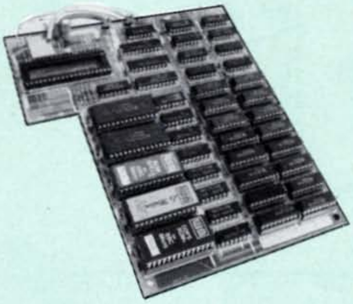
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£21** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No, User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	***£39***
● ROM/RAM card with 64k dynamic RAM	***£52***
● ROM/RAM card with a massive 128k dynamic RAM	**£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	**£6**
● 16k Dynamic RAM for Upgrade	**£7.50**
● Battery backup	**£3**
● Read and Write protect switches	**£2** each
Complete ROM-RAM board All options installed	**£89**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£94***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog, Ref, Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£94** **(Carr £3)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	**£12**
Delta 3B Twin Joysticks	**£17**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£12**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Versatile **BEEB SPEECH SYNTHESISER** Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£48**
CARETAKER Basic Utility	**£25**
DISC DOCTOR	**£28**
Graphics ROM	**£23**
TERMI	**£25**
COMMUNICATOR	**£49**
SPEECH ROM	**£24**
Printmaster	**£24**

Wordwise £24

Wordwise plus £40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £45

Inter SHEET ONLY £37

INTER CHART ONLY: £26

Inter-WORD £38

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM **£85**

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	**£35**
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator (Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£39**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£72**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	**£8**
Juki & Brother HR15 (Disc)	**£8**
Silver Reed Printers (Disc)	**£8**

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	**£29**
Adv 1770 DFS for Mast/Compact	**£29**
Adv 1770 DFS for BBC/BBC+	**£29**
Adv Disc Investigator	**£24**
Adv. Control Panel	**£29**

MINI OFFICE II

Disc Version	**£14.50**
ROM Version	**£47.00**

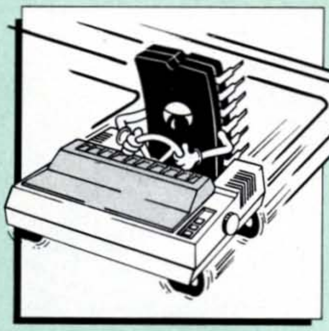
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM **£7**

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles. **Only: £25**

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	**£11.25**
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Espana Viva – 3 Discs	**£19.95**
A Vous La France Disc	**£21.50**

THE NLQ DESIGNER

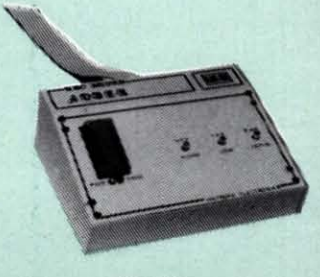
(The First & still the Best) Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. (Please specify 40 or 80 track when ordering.) Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM, FONT Disc and Manual **£25**

(Write in for further details on all above ROMS)

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs:
From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

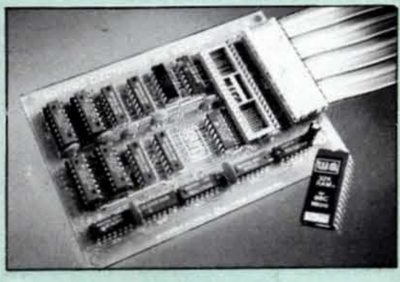
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

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15 Hr Wordprocessing BBC/View	£4.95
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6502 Development Package	£7.50
6502 Reference Guide	£10.95
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68000 User Guide	£8.95
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6809 Machine Code Programming	£7.95
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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL – Uses and abuses of computers.

HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

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DEBUGGING – Specific errors and how to handle them. How to test programs fully.

STANDARD PROGRAMS – Assessing word-processors, spread-sheets, databases, graphics packages, communications etc. How to customise them to your own requirements.

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28 FULL CHAPTERS, elegantly written and extensively indexed. To dip into, consult, or read from cover to cover, again... and again... and again...

Only: **£14.95**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

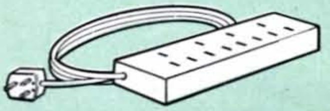
Complete Package **£135.00** (carr. £3)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£7.95 (carr £1.50)

SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

£13.50 (carr. £1.50)

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

£2

Replacement FLEXIBLE 17 way Keyboard Connector £3

28pin DIL HEADER PLUG

SOLDER type **£1.50**; IDC CRIMP type **£1.95**

8 WAY DIP SWITCH

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (suitable for disc drives with PSU).

£14

Watford POWER DUCK **£8**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	£2.00
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to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
Disc Drive Plug 4 way	75p	–
6 way Power Connector	80p	95p

Watford Electronics are the main Approved Stockist of ACORN SPARES and Acorn ECONET Referral Centre

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

AEROSOL DUST SPRAY

This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

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Keyboard	£43	Speaker	£2
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UPD7002	£7.00
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27128-250nS (21V)	£4.25
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7438	40p
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74LS163	70p
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Beebug Retail, Dolphin Place, Holywell Hill, St. Albans.

Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

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Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

Microman Computers, Pasture Lane Farm, Pasture Lane, Rainford, St. Helens, Merseyside WA11 8PU. Tel: 074488 3667.

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Verospeed Ltd, Boyatt Wood, Eastleigh, Hants.

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*Absolute Electronics, Rewal House, 208-210 La Trobe Street, Melbourne, 3000, Victoria, Australia. Tel: (03) 663 2411.

Alpha Computer Co, Shop 314 Chi Fu Commercial Centre, Chi Fu Fa Yuen, Hong Kong, Tel: 5-506592.

Computer Distribution Company, Parklaan, 47, 8-9300 Aalst, Belgium.

E.B.N., Elisenstrasse 13, 1000 Berlin 41. Tel: (030) 7952057

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Scientex P.V.B.A., Zilversmidstraat 2, B-2000 Antwerpen, Belgium, Tel: 03 233 59 06

Techno-matic Data, Holbergsgade 19, 1057 Kobenhavn K, Denmark

*Velobyte, Scheaedyksadyk 5a-6a, 3011 EB Rotterdam, Holland, Tel: (010) 413 8197/414 5171.

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● BBC B DNFS Teac twin DSDD, Taxan 8/0 printer, Microvitec 1451 colour monitor, recorder, rombox, modem, APTL sidewise. Vast amount software, accessories, books, magazines. Cost £2700. Quick sale enthusiast's entire immaculate set up £800. Inventory. Tel: 0732 866227.

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I certify that any software offered for sale is original and not a copy

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POST TO: Micro User Classifieds, Europa House, Adlington Park, London Road, Adlington, Macclesfield SK10 4NP.

Mike Cook reaches for the sky to gaze on some heavenly bodies

When you look upon a star . . .

THE BEEB BODY BUILDING COURSE

THIS month I would like to consider a most unusual add-on to the BBC Micro. It is unique in Body Building history in that it does not actually connect up to the micro. No wires, no power. Puzzled?

I have been interested in astronomy since before I went to primary school. At the age of eight I got a telescope – which I still have – for Christmas. The only trouble was that no one could help me. I had great difficulty in relating small printed star maps to the vast sky.

You see, in the sky the stars aren't joined up in constellations as on the maps. There always seemed to be more stars on the map than I could see, and the scale was different depending on where you looked.

Consequently it took me quite a time to find my way across the sky. Now, if only I had known where to look to find the big red star Betelgeuse in the constellation of Orion the Hunter I would have got on a lot faster.

So this month's project is dedicated to anyone who has ever looked up at the sky and wondered just what they were looking at.

Stars in the sky rise and set exactly like the sun. By the way, I am not referring to here in Manchester where the sun never shines – especially during Old Trafford Test matches.

Stars are continually changing their positions, so where to look to find one will depend on the time and date. A micro can do the calculations and tell us where to look, and this month's hardware can help us locate the correct part in the sky.

What we have to build basically is a theodolite – a piece of surveyer's equipment used mainly for holding up traffic and providing youth opportunity jobs holding poles. Joking apart, a theodolite it is a highly accurate precision instrument, but we can make do with something a lot cheaper. By using two protractors and a little skill we can get accuracy to within a degree.

The coordinates a theodolite measures are azimuth – how far round to look – and altitude – elevation. You can get a large 360 degree protractor in most drawing shops and this will be the basis of the azimuth measurement.

A smaller 180 degree protractor will serve for the altitude, and in fact we only need a quadrant of it. For a sighting tube I used part of a plastic tube used to pack ICs. I tend to have more of those than I know what to do with.

The other components were made from wood and perspex. The general idea can be seen in Figure I.

Make the mounting tube joint pretty firm so that it will stay in the position placed, because we are going to set it up and then look through the tube to spot our star.

There are many possible designs, and to some extent you will be guided by the materials to hand. To set it up, use a compass to set the azimuth to 0 degrees when pointing North: The angle increases as you move clockwise East, South and West.

Having got the hardware, where do we point it? That's where the listing comes in – it shows you where to look to see the 25 brightest stars in the sky. The program needs to know where you are in terms of latitude and longitude. As you are unlikely to have moved each time you run it I have put these as direct lines rather than using an input statement.

You will have to amend lines 90 and 140 for your own location. Both are in three parts – degrees, minutes and seconds of arc with the longitude in degrees West.

Line 230 should be changed if you are in a time zone different from Greenwich – yes, we do have readers in places like Africa and New Zealand – and line 50 should be changed next year.

The program will work up to the year 2000 and after that you'll have to write to me for an update.

All this assumed information is printed out when you run the program and you are then asked for the date, month and day and the local time in hours, minutes and seconds.

The name of the first star is displayed along with its distance from us in light years – the distance light will travel in one year. As light travels at 186,000 miles a second that is quite a long way.

After that the program prints out the continuously changing position of the star. You may be surprised at how fast it is moving – an effect that you have probably not noticed without the aid of alcohol. However, if you have ever set up a telescope on a star you will know that you have to be continually repositioning it. Press the spacebar to see the details of the next star.

A detailed explanation of this program's workings would take up too much space, but the formulae I used were taken from Peter Duffette-Smith's book *Practical Astronomy with your Pocket Calculator* published by Cambridge University Press. Basically what is required is that the siderial time is found.

Siderial time is astronomer's time. One siderial day is the time taken for the stars to return to the same position in the sky. This is slightly shorter than one rotation of the Earth – a day – as the Earth moves in its orbit around the Sun as well as rotating.

This means that in a siderial year there are 366¼ days, as opposed to the 365¼ days in a solar year. So a siderial day is about four minutes shorter than a

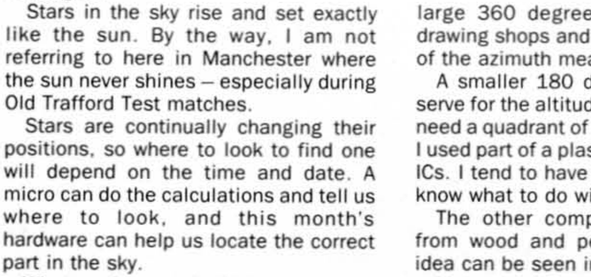

Figure I:

day. Everything is related to the autumnal equinox – September 21st – when Greenwich and the siderial times are exactly the same.

The TIME function on the BBC Micro is set up to correspond to local siderial time. This will move slightly faster than it should, but as the error is only four minutes a day it will not affect accuracy too much. If the program is run much longer than a couple of hours the time should be entered in again.

A star's coordinates are given as declination and right ascension. The declination is how far up it is in the sky when viewed from the equator at the time of the vernal equinox. The right ascension is how far round the star is, given in units of time. This time is the local siderial time when the star's azimuth is exactly 180 degrees.

Given this information and the siderial time along with a handful of coordinate geometry we can find where to look. A negative altitude means that the star is below the horizon, and thus cannot be seen. I have tested the program and get to well within a degree of the star.

However, I have not been able to test it from the southern hemisphere or from other time zones, so failing an expenses-paid invitation, I would appreciate reports from readers abroad on how it fairs.

You no doubt will see what appear to be a few bright stars in the sky that do not correspond to any in the program – these are planets.

Planetary motion can be calculated, but it is a little more tricky and it is covered in the book I mentioned. Tracking planets too would have made the program at least twice as long, but if there is demand I might be tempted to write one at a later date.

So next time you look up at the sky you can say to yourself: "I could know what that star was, if only I had my trusty BBC Micro with me".

With minor changes this program works on a Z88, so equipped with your theodolite, a torch and a Z88 you are all set to become an astronomer. The modifications are on Page 63.

```
   10 MODE4
   20 PRINT TAB(5,4);"BEEB BODY BUILDING
 COURSE"
   30 PRINTTAB(12,6);"April 1988"
   40 PRINTTAB(11,8);"By Mike Cook"
   50 Y%=1988 : REM YEAR
   60 PRINTTAB(7,10);"STAR FINDER for ";
Y%
   70 PRINT "Set year in line 50"
   80 VDU 23,224,48,72,72,48,0,0,0,0
   90 DLW%=2:MLW%=20:SLW%=21 : REM LONGI
TUDE WEST
  100 LW=FN_MSH(DLW%,MLW%,SLW%) : REM CO
NVERT TO DECIMAL
  110 IFLW>180 THEN LW=LW-360
  120 PRINT TAB(0,14);"Longitude West ";
  130 PROC_PANG(LW)
  140 DLA%=56:MLA%=20:SLA%=30 : REM LATA
TUDE
  150 LA=FN_MSH(DLA%,MLA%,SLA%) : REM CO
NVERT TO DECIMAL
  160 PRINT TAB(0,16);"Latitude ";
  170 PROC_PANG(LA)
  180 PRINT:PRINT
  190 INPUT"Month and Date",DM%,DD%
  200 REM FIND OUT IF IT IS A LEAP YEAR
  210 T%=(Y%-1988) AND 3
  220 IF T%=0 THEN LY%=TRUE ELSE LY%=FAL
SE
  230 DGMT=0 : REM DIFFRENCE OF GMT TO L
OCAL TIME
  240 PRINT"Line 230 sets ";DGMT;" hours
"
  250 PRINT"Between local time and GMT"
  260 PRINT
  270 INPUT"Local Time H,M,S ",TH%,TM%,T
S%
  280 PROC_STIDY
  290 TH%=TH%-DGMT
  300 IF TH%>24 THEN TH%=TH%-24 : DD%=DD
%-1
  310 IF TH%<0 THEN TH%=TH%+24 : DD%=DD%
+1
  320 REM TIME AND DATE IS NOW IN GMT
  330 PROC_DAYS
  340 PROC_SST
  350 VDU 23,1,0;0;0;0;
  360 SKY_CLOUDS_OVER=FALSE
  370 RESTORE 1240
  380 REPEAT
  390 PROC_STIDY
  400 PRINTTAB(0,22);"Press SPACE to cha
nge the STAR"
  410 READ D$,DRA%,RAM,DECD%,DECM%
  420 IF D$="" THEN RESTORE 1240:GOTO 41
0
  430 PRINTTAB(0,13);"Location of ";D$;"
 L.Y.";SPC(15)
  440 RA=FN_HMC(DRA%,RAM)
  450 DEC=FN_HMC(DECD%,DECM%)
  460 REPEAT
  470 PROC_WHERE(RA,DEC)
  480 PRINTTAB(0,18);
  490 PRINT"Azimuth ";:PROC_PANG(AZ)
  500 PRINT"Altitude ";:PROC_PANG(ALT)
  510 PRINT
  520 UNTIL INKEY(-99)
  530 UNTIL SKY_CLOUDS_OVER
  540 END
  550 DEF PROC_DAYS
  560 RESTORE 1190
  570 AD%=0
  580 IF DM%=1 THEN GOTO 660
  590 T%=1
  600 REPEAT
  610 READ TD%
  620 AD%=TD%+AD%
  630 IF T%=2 AND LY%=TRUE THEN AD%=AD%+
1
  640 T%=T%+1
  650 UNTIL T%=DM%
  660 AD%=AD%+DD%
  670 REM WE NOW HAVE NUMBER OF DAYS SIN
CE YEAR START
  680 ENDPROC
  690 DEF PROC_SST
  700 REM SET SIDERIAL TIME
  710 RESTORE 1220
  720 REM SET SIDERIAL TIME
  730 REPEAT
  740 READ B
  750 Y%=Y%-1
  760 UNTIL Y%<1988
  770 TZ=(AD%*0.065709)-B
  780 GMTH=(FN_MSH(TH%,TM%,TS%))*1.00274
3
  790 TZ=TZ+GMTH
  800 TZ=FN_HC(TZ)
  810 TZ=TZ-(LW/15)
  820 TZ=FN_HC(TZ)
  830 REM NOW CONVERT TO CENTISECONDS
  840 TIME=TZ*60*60*100
  850 ENDPROC
  860 DEF PROC_WHERE(RA,DEC)
  870 REM FIRST FIND HOUR-ANGLE
  880 IF TIME > 8640000 THEN TIME=0
  890 LST=TIME/360000
  900 HA=LST-RA
  910 IF HA<0 THEN HA=HA+24
  920 ALT=ASN( SIN(RAD(DEC)) * SIN(RAD(L
A)) + COS(RAD(DEC)) * COS(RAD(LA)) * COS
(RAD(HA*15)) )
  930 ALT=DEG(ALT)
  940 AZ=ACS( (SIN(RAD(DEC)) - (SIN(RAD(
LA)) * SIN(RAD(ALT)) )) / ( COS(RAD(LA))
 * COS(RAD(ALT)) ))
  950 AZ=DEG(AZ)
  960 IF SIN(RAD(HA*15)) > 0 THEN AZ=360
-AZ
  970 ENDPROC
  980 DEF PROC_PANG(T)
  990 PRINT STR$(INT(T));CHR$(224);SPC(1
);
 1000 T=(T-INT(T))*60
 1010 PRINT STR$(INT(T));"'";
 1020 T=(T-INT(T))*60
 1030 PRINT STR$(INT(T));CHR$(34);SPC(5)
 1040 ENDPROC
 1050 DEF PROC_STIDY
 1060 FOR A%=11 TO 23
 1070 PRINTTAB(0,A%);SPC(39);
 1080 NEXT
 1090 ENDPROC
 1100 DEFFN_HC(T)
 1110 IF T >24 THEN T=T-24
 1120 IF T < 0 THEN T=T+24
 1130 =T
 1140 DEFFN_MSH(H%,M%,S%)
 1150 =H%+(M%/60)+(S%/(60*60))
 1160 DEF FN_HMC(H%,M)
 1170 =H%+(M/60)
 1180 REM DAYS IN EACH MONTH
 1190 DATA 31,28,31,30,31,30
 1200 DATA 31,31,30,31,30,31
 1210 REM YEAR CONSTANTS
 1220 DATA 17.407368,17.357573,17.373487
,17.389402,17,405316,17.355521
 1230 DATA 17.371435,17.387349,17.403264
,17.353468,17.369383,17.385297,17.401211
 1240 DATA Sirius 8.7,6,44.2,-16,-42
 1250 DATA Canopus 98,6,23.5,-52,-41
 1260 DATA Arcturus 36,14,14.8,19,17
 1270 DATA Rigil Kentaurus 4.2,14,38.4,-
60,-46
 1280 DATA Vega 26.5,18,36.2,38,46
 1290 DATA Capella 45,5,15.2,45,59
 1300 DATA Rigel 900,5,13.6,-8,-13
 1310 DATA Procyon 11.4,7,38.2,5,17
 1320 DATA Betelgeuse 520,5,54,7,24
```

Turn to Page 134 ►

◀ *From Page 133*

```
 1330 DATA Achernar 118,1,37,-57,-20
 1340 DATA Hadar 490,14,2.4,-60,-16
 1350 DATA Altair 16.5,19,49.8,8,49
 1360 DATA Aldebaran 68,4,34.8,16,28
 1370 DATA Spica 220,13,24.1,-11,-3
 1380 DATA Antares 520,16,28.2,-26,-23
 1390 DATA Fomalhaut 22.6,22,56.5,-29,-4
4
 1400 DATA Pollux 35,7,44.1,28,5
 1410 DATA Deneb 1600,20,40.7,45,12
 1420 DATA Beta Crucis 490,12,46.6,-59,-
35
 1430 DATA Regulus 84,10,7.3,12,4
 1440 DATA Acrux 370,12,25.4,-62,-59
 1450 DATA Adhara 680,6,57.8,-28,-57
 1460 DATA Shaula 310,17,32.3,-37,-5
 1470 DATA Bellatrix 470,5,24,6,20
 1480 DATA Elnath 300,5,25,28,36
 1490 DATA Pleiades cluster various,2,20
,57,0
 1500 DATA ",0,0,0,0
```

This listing is included in this month's tape & disc offer. See order form on Page 159.

Get it right!

```
  10 = BA9F F | 260 = FF3E 2 | 510 = FF3E 9 | 760 = 3BAB 3 | 1010 = 69E0 9 | 1260 = E4A6 1
  20 = 2128 4 | 270 = 9F03 5 | 520 = 4CF5 1 | 770 = 856E 3 | 1020 = 1079 5 | 1270 =  720 1
  30 = FEA4 A | 280 = 372E 7 | 530 = E805 9 | 780 =  98D 2 | 1030 = D744 D | 1280 = 95C1 7
  40 = D700 E | 290 = D8ED 1 | 540 = FD2E 5 | 790 = EAC8 B | 1040 = ED0F 2 | 1290 = 4930 A
  50 = 6A9B F | 300 = 52BC 6 | 550 = 3401 6 | 800 = 8D7D A | 1050 = A1E0 2 | 1300 = EAAE 3
  60 = ABBA E | 310 = 27B3 0 | 560 = 18F3 8 | 810 = 5F06 C | 1060 = 7F14 D | 1310 = DDDF A
  70 = 16B3 C | 320 =    0 0 | 570 = 37F8 D | 820 = 8D7D F | 1070 = D457 2 | 1320 = 34AF 9
  80 = 8CE4 5 | 330 = 3A76 4 | 580 = 29BA 7 | 830 =    0 F | 1080 = 2C83 8 | 1330 = 3D87 0
  90 = 5593 F | 340 = 9C03 C | 590 = 8747 4 | 840 = AD19 4 | 1090 = ED0F 8 | 1340 = 1304 0
 100 = 37E9 1 | 350 = 4515 D | 600 = BFBA B | 850 = ED0F F | 1100 = 6F8D 3 | 1350 = 99AC D
 110 = C59D 8 | 360 = CF45 A | 610 = D10B F | 860 = F35B 2 | 1110 =  C9F 8 | 1360 = 5195 2
 120 = 33A9 2 | 370 = 7D0A 6 | 620 = 593B C | 870 =    0 2 | 1120 = E06E 8 | 1370 = 8EE0 1
 130 = BB88 4 | 380 = BFBA F | 630 = A10C 5 | 880 = CD44 E | 1130 = 69B8 B | 1380 = 9B12 E
 140 = 24E8 A | 390 = 372E D | 640 = 5E5E D | 890 = DAD2 A | 1140 = 9400 C | 1390 = ACF6 D
 150 = 598B 4 | 400 = 7606 A | 650 = F39C 9 | 900 = A5D4 A | 1150 = B788 9 | 1400 = 846C 4
 160 = 894B 4 | 410 = 6D38 9 | 660 = FC17 2 | 910 = 3B03 9 | 1160 = 50DE 8 | 1410 = 3305 C
 170 = 125D A | 420 = A9C2 9 | 670 =    0 2 | 920 = 3160 D | 1170 = 69AA C | 1420 = 2899 3
 180 = C102 2 | 430 = 3E41 9 | 680 = ED0F 8 | 930 =  DB2 1 | 1180 =    0 C | 1430 = 1BD0 8
 190 = DC08 4 | 440 = 5469 A | 690 =  26F B | 940 = 5398 9 | 1190 = C751 3 | 1440 = EA34 9
 200 =    0 4 | 450 = 9091 D | 700 =    0 B | 950 =  2CA D | 1200 = 43B8 0 | 1450 = F128 3
 210 = B390 9 | 460 = BFBA A | 710 = 3B14 7 | 960 =  F68 4 | 1210 =    0 0 | 1460 = 2949 4
 220 =  8C1 0 | 470 = F738 1 | 720 =    0 7 | 970 = ED0F D | 1220 = 207F 1 | 1470 = 4095 4
 230 = FAAA E | 480 = F3E5 D | 730 = BFBA 6 | 980 = 3666 7 | 1230 = A941 0 | 1480 = 1A89 C
 240 = C867 5 | 490 = 21DC B | 740 = D462 6 | 990 = 8E09 D | 1240 = 846D 2 | 1490 = 168C D
 250 = FCC0 7 | 500 = 9A57 A | 750 = 2774 4 | 000 = 1079 7 | 1250 = 5126 5 |
```

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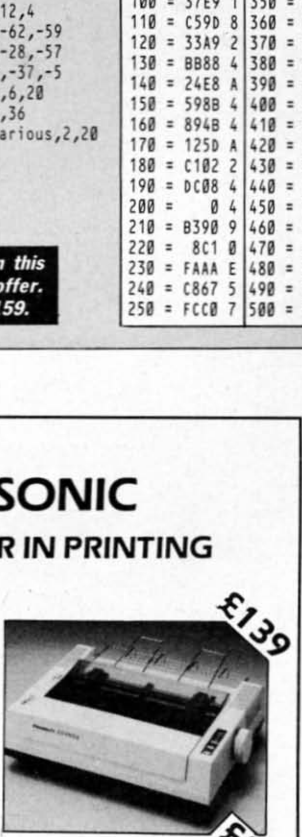
YOUR PARTNER IN PRINTING



KX-P1081

10" 120 cps Dot Matrix Printer

- 120 cps Draft; 24 cps NLQ
- Near Letter Quality printing in all pitches
- Dip switch selectable IBM® Printer modes
- High resolution, dot-addressable graphics
- Friction feed and adjustable tractor are standard

KX-P1082

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- Courier and Bold NLQ Fonts
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- Friction feed and adjustable tractor are standard

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DELTA COMPUTERS

BBC MASTER SERIES	
Archimedes	Ring for price
Master 128	£395.00
Master Compact Entry System	£349.00
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5802 400K DS DD 40/80T.	£104.95
5802DB Dual 800K 40/80T.	£204.95
5802D as 5802DB+PSU	£234.95
Opus DDOS (With a drive)	£40.00

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Amstrad DMP3000	£179.00
Amstrad DMP3160	£199.00

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Canon PC1080A	£3.25
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Epson LX80, LX86	£2.70
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Brother HR5 Printer	£69.99

*** A Vu-File and Vu-Calc with every Master purchased ***
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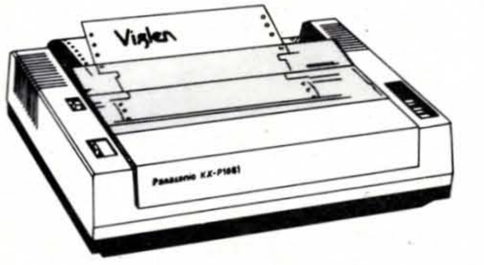
VISA VISA

SPECIAL OFFERS FROM VIGLEN

PANASONIC PRINTER KIT



The Panasonic KX-P1081 come complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand. Features include:

- ★ 120 cps draft printing 24 cps NLQ
- ★ IBM and Epson compatibility through dip switch settings
- ★ Prints 80 coloumns on A4 cut sheets, continuous stationery or roll paper 9 × 9 draft and 18 × 23 NLQ

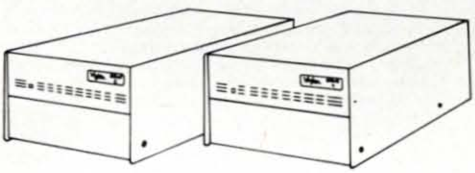
Stock Code	Description	Price inc. VAT
SP079	Panasonic KX-P1081 plus accessories	£185.95

Please add £8 for insured courier delivery.

WINCHESTER

MEGA BYTES FOR MINI BUCKS

NEW LOW PRICES



Plug in 20 to 112 Megabytes of extra storage with the Viglen Winchester system.

The Viglen Winchester is ready to plug in and use on a BBC Master micro; for a BBC B or B plus you will merely need to fit the Acorn ADFS Rom. The Winchesters are 100% compatible with the Acorn Winchester and Acorn ADFS and will also work with the Acorn Master 512 board with DOS plus.

Drive 1 Winchesters are also available for backup or just more storage and simply plug into the back of the Drive 0 unit.

The Winchester package consists of: Winchester unit (cased with controller boards, power supply and fan), Master reference Manual part 1, Winchester user guide and Winchester utilities on disk (such as formatter, verifier, ADFS menu and sophisticated backup program allowing you to make fast backups on DFS disks, ADFS disks or Drive 1 Winchester).

Stock Code	Description	Price inc. VAT
Drive 0 Single		
SP0150	VB20 20Meg Viglen Winchester	£499.00
SP0152	VB28 28Meg Viglen Winchester	£519.00
V155	VB40 40Meg Viglen Winchester	£799.00
V156	VB56 56Meg Viglen Winchester	£899.00
Drive 1 Second Drive		
SP0160	VB120 20Meg Drive 1 Winchester	£479.00
SP0162	VB128 28Meg Drive 1 Winchester	£499.00
V165	VB140 40Meg Drive 1 Winchester	£739.00
V167	VB156 56Meg Drive 1 Winchester	£769.00
V157	20MB Tape Streamer Backup	£689.00
V503	Acorn ADFS Rom and Manual (Only necessary for BBC B or B Plus)	£29.95

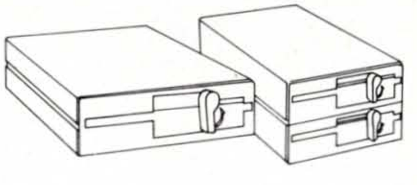
Please add £8 for insured courier delivery.

Available for use with SJ research file server at no extra cost, please specify when ordering.

DISK DRIVES

FROM £99.95 inc. VAT

The finest Japanese disk drives (not Taiwanese immitations) available at the lowest prices.



All disc drives are supplied with a manual, packed utilities disc and a full 12 Months warranty (2 Year Warranty available) and are ready to plug in and use on a BBc B (fitted with a DFS) B + or Master micro. 40/48 Track drives have a switch which enables operation in either 40 or 80 track mode.

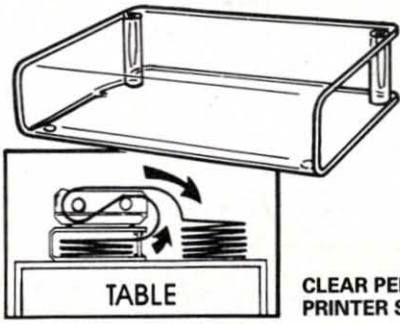
The capacity quoted are given in single density mode; for double density mode (1770 DFS + ADFS as in the Master) the capacities should be approximately doubled.

An integral power supply is not necessary as the disc drives run from the micro's power source however should you require drives with their own power supply, these are also available. If your BBC B micro does not have a DFS fitted then you will also require the Acorn dfs kit. These are available from Viglen.

Stock Code	Description	Price inc. VAT
SP014	400K Single Drive 40/80T	£99.95
SP030	400K Single Drive 40/80T + PSU	£109.95
SP019	800K Dual Drive 40/80T	£189.95
SP020	800K Dual Drive 40/80T + PSU	£209.95
VPD0240	100K Single Drive	£105.95
VPD0241	400K Single Drive 40/80T	£113.00
VPD0242	200K Dual Drive	£195.95
VPD0243	800K Dual Drive 40/80T	£219.00
VPD0245	100K Single Drive + PSU	£119.95
VPD0246	400K Single Drive + PSU	£135.00
VPD0247	200K Dual Drive + PSU	£209.95
VPD0248	800K Dual Drive 40/80T + PSU	£235.00
VPD0249	800K Dual Drive 40/80T + PSU in Metal Bridge Unit	£265.00
V0060	3.5" 400K Single Drive	£95.95
V0061	3.5" 800K Dual Drive	£199.95
V0062	3.5" 400K Single Drive + PSU	£135.00
V0063	3.5" 800K Dual Drive + PSU	£199.00
V0064	3.5" and 5.25" 800K Dual Drive	£219.00
V0065	3.5" and 5.25" 800K Dual Drive with PSU	£249.00

Please add £8.00 for insured courier delivery.

PRINTER STANDS



CLEAR PERSPEX PRINTER STAND

The Viglen printer stands are beautifully finished in clear perspex and raise the printer high enough to put continuous stationary underneath.

Stock Code	Description	Price inc. VAT
V490	80 Column Printer Stand (15" × 13" × 3.5")	£19.95
V491	136 Column Printer Stand (23.5" × 13" × 3.5")	£29.95

Please add £3 P & P

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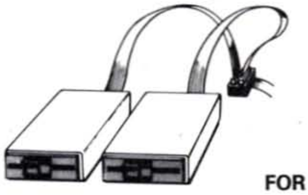
SPECIAL OFFERS FROM VIGLEN

DUCKS



DUAL DRIVES FOR LESS THAN £17!

The Viglen Data DUCK (Dualling Up Connector Kit) converts any two single drives to a dual drive instantly. Simply plug the duck into the micro's disk drive socket and plug two single drives (any type and any make) into the duck to obtain a dual drive system accessed as drive 0 (and 2 if double sided) and drive 1 (and 3 if double sided). If neither single drive has its own power supply then you will require a Viglen power DUCK in order to obtain two disk drive power sockets from the micro.

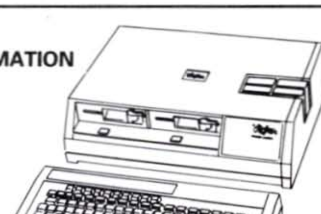
- ★ No soldering simply plugs in.
- ★ No need to take disk drives apart to change links.

Stock Code	Description	Price inc. VAT
V084	Viglen data duck	£16.95
V085	Viglen power duck	£7.95

Please add £2.50 for P & P.

CONSOLE SYSTEM

MASTER TRANSFORMATION



Give your BBC Master micro the professional PC look by replacing your existing lid with this smartly styled package. The system is strong and constructed in high impact ABS colour matched to the BBC Master and it gives your Master a very neat and impressive look.

- ★ Will support monitors including up to 16" TV.
- ★ Can house two 5¼" disk or Winchester drives.
- ★ Capable of housing 3½" drives.
- ★ Will accept Acorn cartridges and the Viglen Master Cartridge system.
- ★ Full internal metal screening.
- ★ Also available with fitted drives (5¼", 3½" or Winchester) or as a complete system including the Master.

The Master console unit system packages includes:

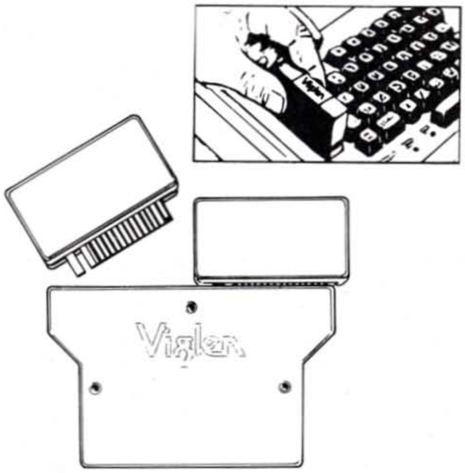
- ★ Remote Keyboard case with cable.
- ★ Metal screened main unit casing (including internal fittings for 5¼" drives).
- ★ Two switches which can be used for 40/80 track switching and can be either fitted on the front or rear of unit.
- ★ Two blanking plates to blank out any drive aperture that is not used.
- ★ Full labelling kit.
- ★ Fully illustrated fitting instructions.

Stock Code	Description	Price inc. VAT
V861	Viglen Master Console unit	£59.95
Accessories for the Master Console unit		
V853	Dual Drive data cable for console unit	£9.95
V854	Dual Drive power cable for console unit	£7.95
V855	Power supply for the console unit	£34.95
V866	Fan Kit for console unit	£34.95
V858	Fitting bracket for 3½" drive	£8.95
V851	Viglen Professional Console Unit for the BBC micro	£49.95
	Fitting service available from	£15.00

Please add £8 for insured courier delivery.

CARTRIDGE SYSTEM

VIGLEN ROM CARTRIDGE SYSTEM



Having fitted the Viglen Rom cartridge system to your BBC, Master or Master COMPACT, you can plug in your Roms/Eproms simply by inserting each one in a Viglen cartridge and plugging in whichever cartridge you want to use. The same Viglen cartridge can be used on all the micros mentioned and there is no need to switch the micro on and off between cartridge changes.

The Viglen cartridge system for the BBC micro consists of the cartridge cable assembly and socket, blanking off plates, 1 cartridge and cartridge storage rack. The cartridge socket when fitted protrudes from the rectangular slot on the left of the keyboard where the cartridges are subsequently inserted. It is simple to fit and requires no soldering.

The Viglen cartridge system for the Master and Master COMPACT simply plugs into your Master cartridge slot (or COMPACT expansion port) and accepts two Viglen cartridges. On the Master you can plug in up to two Viglen cartridge systems thus giving you access to 4 Viglen Cartridges simultaneously. The system comes complete with 2 cartridges and cartridge storage rack. On the Master you can also use Viglen cartridges which have 32 and 64K paged Roms inserted.

Stock Code	Description	Price inc. VAT
V560	Viglen Rom cartridge system for BBC	£12.95
V559	Viglen Rom cartridge system for BBC (low profile)	£12.95
V550	Viglen Rom cartridge system for Master	£14.95
V551	Viglen Rom cartridge system for COMPACT	£14.95
V561	Single Viglen cartridge	£3.45

Please add £2.50 P & P (£00.50 for single cartridge).

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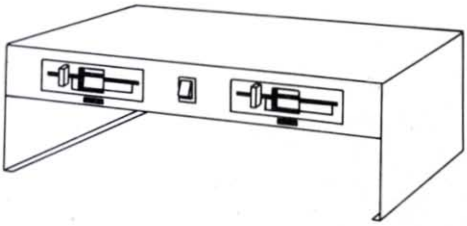
SPECIAL OFFERS FROM VIGLEN

DISK DRIVES

DIRECT BRIDGE
BRIDGE UNIT

SPECIAL OFFER
£229.95 INC VAT



★ FRONT PANEL SWITCHING
★ 800K DUAL DRIVES 40/80T WITH PSU

Direct disk drives are manufactured to the highest standard using high quality Japanese mechanisms. All drives are supplied complete with user manual and utility diskette.

Stock Code	Description	R.R.P.
SP0249	800K Drive in Bridge Unit with PSU	£229.95

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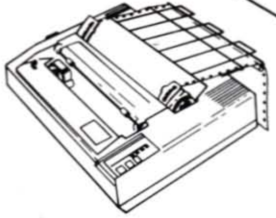
DOT MATRIX PRINTER

SPECIAL OFFER
£119.00 INC VAT



SPECIAL OFFER
★ ONLY WHILE STOCK LASTS ★

The MT1712 dot matrix printer offers INCREDIBLE value for money. Just look at the following features:

- ★ Epson RX80 Compatible with Pica, Elite, Condensed, Super and Subscript, proportional spacing
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- ★ Built in push tractor feed giving minimum waste tearout bar
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- ★ Quad density graphics mode
- ★ 112 byte internal buffer expandable to 4K
- ★ Uses standard MANNESMAN TALLY MT80 ribbons
- ★ Full 12 month warranty.

Price INCLUDES printer cable for the BBC computer.

Stock Code	Description	R.R.P.
SP080	MT1712 printer with BBC cable	£119.00

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Viglen

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Hanwell, London W7 2QA
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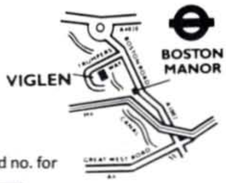

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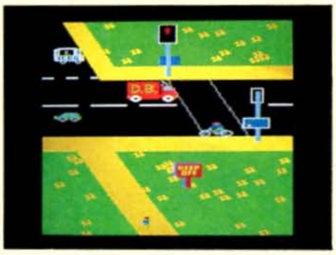
Pelmanism
Towers of Hanoi



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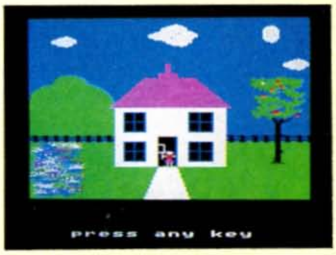
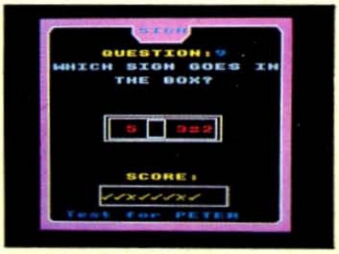


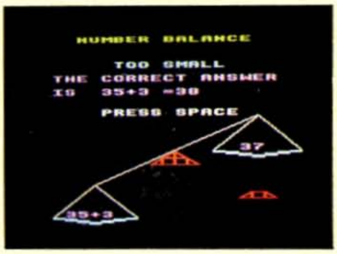
```
press any key
```

HOUSE
Select the colours to draw a house – hours of creative entertainment



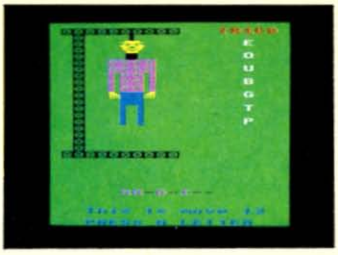
```
SIGN
QUESTION: 9
WHICH SIGN GOES IN
THE BOX?
5 ☐ 3=2
SCORE:
✓✓X✓✓✓X✓
Test for PETER
```

NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten



```
NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER
IS   35+3 =38
PRESS SPACE
```

BALANCE
Learn maths the fun way. Type in the answer to balance the scales



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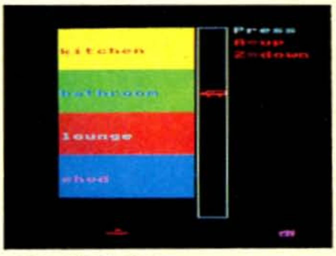


```
kitchen
bathroom
lounge
shed
Press
A=up
Z=down
```

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER PLEASE USE THE FORM ON PAGE 159

Chris Ewels invites you to toe the line and test your skill with . . .

180

DARTS is one of the most popular sports on TV at present, and now you too can play onscreen. Here's a version that allows you to compete against a friend or your BBC Micro. All the normal rules of darts apply, and you can play from 301 or 501 down.

The board is realistically drawn in the official colours. The points value for each segment is displayed round the outside and the players' current scores are shown in the bottom left-hand corner.

The darts are represented by crosses, with a degree of hand shake depending on the skill level chosen. They are steered using the keys shown. Press the spacebar to throw – or you can use a joystick.

You can speed up the dart's movement by pressing Shift and Control in conjunction with the steering keys.

PROCEDURES

throw()	Controls throwing of a dart
scr	Calculates score of throw
calc	Calculates coordinates of throw
m()	Prints message
bull	Bull thrown
key	Keyboard control
joy	Joystick control
instruct	Displays instructions
comp	Computer throw
out	Computer end-game
d	Displays players score
init	Initialises program
dart	Draws a dart
board	Draws the board

VARIABLES

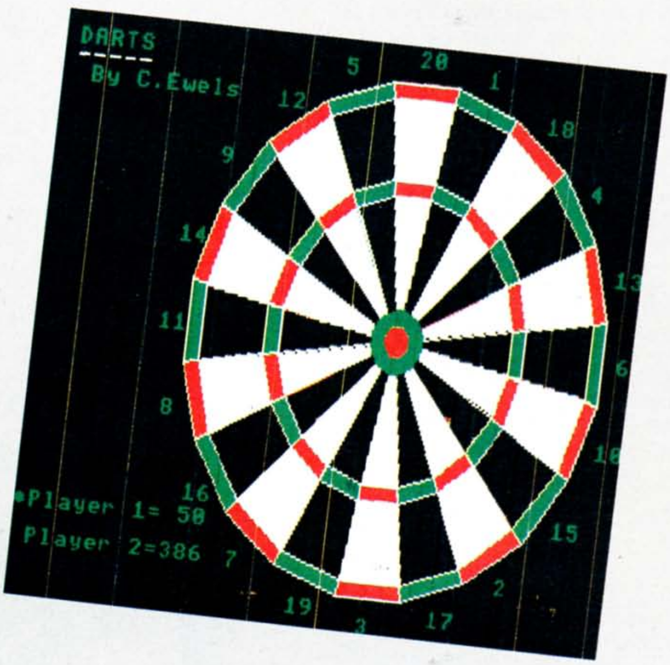
X(3),Y(3)	Coordinates of darts
Lv%	Level of game
play	Computer or player flag
joy()	Keyboard or joystick input flag
sc%()	Player scores
first()	First scoring dart flag
fire	Dart thrown flag
sc%	Dart score
Le	Distance of current dart from board centre
ang	Angle of current dart from vertical
MG(6)	Distance from centre of each ring
X	X coordinate of board centre
Y	Y coordinate of board centre
A()	Sine values for each segment
B(20)	Cosine values for each segment

```
   10 REM >>>>> DARTS >>>>>
   20 REM    Chris Ewels
   30 REM  (c) Micro User
   40 MODE7:PROCreloc(&E00)
   50 ON ERROR PROCerror
   60 MODE 7
   70 PROCinit
   80 PROCinstruct
   90 REPEAT UNTIL GET=32
  100 MODE1:VDU19,2,7;0;19,3,2;0;
  110 VDU23;8202;0;0;0;
  120 RESTORE 2480
  130 PROCboard
  140 PROCprint"" DARTS"
  150 COLOUR2:PRINT" -----":COLOUR3
  160 PRINT"  By C.Ewels"
  170 PROCdatainput
  180 PROCd(1):PROCd(2)
  190 play=(A$="1")
  200 first(1)=TRUE:first(2)=TRUE
  210 REPEAT FOR L%=1 TO 2
  220 PROCthrow(L%)
  230 PROCm(6)
  240 IF sc%(L%)=0 L%=5
  250 NEXT
  260 PRINTTAB(1,27)SPC10TAB(1,29)SPC10
  270 UNTIL sc%(1)=0 OR sc%(2)=0
  280 FORG=1 TO 30:SOUND1,-15,53,1:SOUND
1,0,53,1:NEXT
  290 PRINTTAB(9,28+(sc%(1)=0)*2);
  300 COLOUR1:PRINT"WIN!":VDU30:GOTO140
  310 DEFPROCthrow(S)
  320 IF S=1 PRINTTAB(0,26)"*"TAB(0,28)S
PC1
  330 IF S=2 PRINTTAB(0,26)SPC1TAB(0,28)
"*"
  340 FOR G=1 TO 3:x%(G)=-100:y%(G)=-100
:NEXT
  350 FOR G=1 TO 3:*FX15
  360 IF play AND S=2 PROCcomp:GOTO480
  370 x%(G)=RND(500)+500:y%(G)=RND(1023)
  380 PROCdart
  390 REPEAT PROCdart:PROCcalc
  400 x%(G)=x%(G)+RND(Lv%)-(Lv%/2)
  410 y%(G)=y%(G)+RND(Lv%)-(Lv%/2)
  420 fire=FALSE
  430 IF joy(L%) PROCjoy ELSE PROCkey
  440 IF x%(G)>1279 x%(G)=1279
  450 IF x%(G)<260 x%(G)=260
  460 IF y%(G)<0 y%(G)=0
  470 IF y%(G)>1023 y%(G)=1023
  480 PROCdart:UNTIL fire:PROCm(6)
  490 SOUND1,-15,20,2:PROCscr
  500 IF S=1 PRINTTAB(1+((G-1)*3),27);sc
% ELSE PRINTTAB(1+((G-1)*3),29);sc%
  510 IF M=0 GOTO 630
  520 FOR lp%=1 TO 2
  530 IF S=lp% IF first(lp%) IF M<>2 PRO
Cm(1):lp%=5:GOTO580
  540 IF S=lp% IF first(lp%) IF M=2 SOUN
D2,-15,73,2:first(lp%)=FALSE
  550 IF S=lp% IF sc%(lp%)-sc%=0 IF M=2
lp%=6:GOTO580
  560 IF S=lp% IF sc%(lp%)-sc%<2 PROCm(4
):lp%=5:GOTO580
  570 IF S=lp% IF sc%(lp%)-sc%<=0 IF M<>
2 PROCm(2):lp%=5:GOTO580
  580 NEXT
  590 IF lp%=6 GOTO 630
  600 IF lp%=7 G=6
  610 sc%(S)=sc%(S)-sc%
  620 PROCd(S)
  630 NEXT
  640 IF G=7 GOTO 670
  650 SOUND1,-15,101,5:*FX15
  660 Z%=INKEY(150)
  670 FOR G=1 TO 3:PROCdart:NEXT
  680 ENDPROC
  690 DEFPROCscr
  700 sc%=0:M=0:PROCcalc
  710 FOR lp%=1 TO 6:IF ABS(Le-(MG(lp%)-
4))<3 lp%=399:sc%=0
  720 NEXT
  730 IF lp%=400 GOTO 760
  740 lp%=(ang-9)/18+2:IF lp%>20 lp%=lp%
-20
```

Turn to Page 140 ▶

◀ From Page 139

```
  750 lp%=lp%*18-9:IF ABS(ang-lp%)<3 lp%
=400
  760 IF Le>MG(1) OR lp%=400 FOR T%=15 T
O 0 STEP-3:SOUND0,-T%,5,2:NEXT
  770 IF lp%=400 PROCm(5):ENDPROC
  780 IF Le>MG(1) PROCm(3):ENDPROC
  790 IF Le<MG(6) PROCbull:ENDPROC
  800 IF Le>MG(6) AND Le<MG(5) FOR T%=1
TO 50 STEP 5:SOUND1,-9,T%,2:NEXT:sc%=25:
M=1:ENDPROC
  810 M=1
  820 IF Le>MG(4) IF Le<MG(3) M=3
  830 IF Le>MG(2) IF Le<MG(1) M=2
  840 RESTORE 2480
  850 D%=(ang-9)/18+2:IF D%>20 REPEAT D%
=D%-21:UNTIL D%<21
  860 FOR T%=1 TO D%:READ H:NEXT
  870 sc%=H*M:ENDPROC
  880 DEFPROCcalc
  890 D=x%(G)-X:H=y%(G)-Y
  900 Le=SQR(D^2+H^2)
  910 IF D=0 IF H>0 ang=0:GOTO960
  920 IF D=0 IF H<0 ang=180:GOTO960
  930 IF D=0 IF H=0 Le=1:ang=0:ENDPROC
  940 ang=DEGATN(H/D):ang=90-ang
  950 IF ang>360 REPEATang=ang-360:UNTIL
ang<=360
  960 IF x%(G)<X ang=ang+180
  970 Le=INT(Le+.5):ang=INT(ang+.5)
  980 ENDPROC
  990 DEFPROCm(L%):RESTORE 2490
 1000 VDU4:FOR T%=1 TO L%:READA$,B$:NEXT
 1010 FOR A%=1 TO 13
 1020 G$=MID$(A$,A%,1):H$=MID$(B$,A%,1)
 1030 IF G$="&" G$=" "
 1040 IF H$="&" H$=" "
 1050 PRINTTAB(1,A%+6)G$" "H$:NEXT
 1060 IF L%=3 OR L%=5 OR L%=6 ENDPROC
 1070 FOR T%=20 TO 1 STEP -1:SOUND1,-15,
T%,1:NEXT:G=3:ENDPROC
 1080 DEFPROCbull
 1090 FORT=1 TO 100 STEP 5:SOUND1,-15,T,
2:NEXT:M=2:sc%=50
 1100 FOR lp%=1 TO 2
 1110 IF S=lp% IF first(lp%) first(lp%)=
FALSE:SOUND1,-15,73,2
 1120 NEXT
 1130 ENDPROC
 1140 DEFPROCcomp
 1150 Lv%=Lv%/5-1
 1160 IF first(2) Le=RND(MG(1)-MG(2))+MG
(2):ang=RND(360):GOTO1220
 1170 IF sc%(2)<=50 PROCout:GOTO1220
 1180 Le=RND(MG(1))
 1190 IF Lv%>3 IF RND(3)=1 Le=RND(MG(1)-
MG(2))+MG(1)+RND((11-Lv%)*10)-((11-Lv%)*
5)
 1200 IF Lv%>6 IF RND(2)=1 Le=RND(MG(3)-
MG(4))+MG(4)+RND((11-Lv%)*10)-((11-Lv%)*
5)
 1210 A%=21:REPEAT A%=A%-1:UNTILRND(11-L
v%)=1 OR A%=1:ang=FNang(A%)
 1220 x%(G)=X+SINRADang*Le:y%(G)=Y+COSRA
Dang*Le
 1230 x%(G)=x%(G)+RND((11-Lv%)*4)-(11-Lv
%)*2
 1240 y%(G)=y%(G)+RND((11-Lv%)*4)-(11-Lv
%)*2
 1250 fire=TRUE:Lv%=(Lv%+1)*5:*FX15
 1260 lp%=INKEY(75):REPEAT:ENDPROC
 1270 DEFPROCout
 1280 IF sc%(2)=50 Le=1:ang=RND(360):END
PROC
 1290 IF sc%(2)>40 ENDPROC
```



```
 1300 IF sc%(2)/2<>INT(sc%(2)/2) GOTO 13
20
 1310 Le=RND(MG(1)-MG(2))+MG(2):ang=FNan
g(sc%(2)/2):ENDPROC
 1320 A=RND(sc%(2)):IF A/2=INT(A/2) OR A
>19 GOTO 1320
 1330 ang=FNang(A):Le=RND(MG(1)):ENDPROC
 1340 DEFFNang(D):RESTORE 2480:LOCALB%:B
%=-1:REPEATB%=B%+1:READC:UNTILC=D:=B%*18
 1350 DEFPROCd(A%):LOCAL Y%:Y%=(A%-1)*2
 1360 PRINTTAB(1,26+Y%)"Player "STR$A%;
 1370 PRINT"="RIGHT$(sp$+STR$sc%(A%),3)
 1380 ENDPROC
 1390 DEFPROCjoy
 1400 LOCAL A%,B%:A%=ADVAL(0) AND 3
 1410 IF A%>0 fire=TRUE:ENDPROC
 1420 A%=1:B%=2:IF L%=2 A%=3:B%=4
 1430 x%=-(ADVALA%-32767)DIV&800
 1440 y%=(ADVALB%-32767)DIV&800
 1450 x%(G)=x%(G)+x%:y%(G)=y%(G)+y%
 1460 ENDPROC
 1470 DEFPROCinit:@%=0:*FX4,1
 1480 VDU23;8202;0;0;0;
 1490 VDU&FF17;&FFFF;&FFFF;&FFFF;&FFFF;
 1500 DIMA(21),B(21),x%(3),y%(3),sc%(2),
MG(6),first(2),joy(2)
 1510 sp$=STRING$(3," "):RESTORE 2570
 1520 FOR T%=1 TO 6:READ MG(T%):NEXT
 1530 FOR T%=0 TO 20
 1540 A(T%)=SINRAD((T%*18)-9)
 1550 B(T%)=COSRAD((T%*18)-9):NEXT
 1560 FOR T%=1 TO 3:x%(T%)=-100
 1570 y%(T%)=-100:NEXT
 1580 X=775:Y=510:ENDPROC
 1590 DEFPROCdraw(S,P,N):LOCAL A,B
 1600 A=A(P)*MG(N)+X:B=B(P)*MG(N)+Y
 1610 IF S=1 MOVEA,B ELSEIF S=2 DRAWA,B
 1620 IF S=3 MOVESINRAD((T-1)*18)*490-20
+X,COSRAD((T-1)*18)*490+Y+10
 1630 ENDPROC
 1640 DEFPROCkey:inc=8
 1650 IF INKEY0=32 fire=TRUE
 1660 IF INKEY-1 inc=inc*2
 1670 IF INKEY-2 inc=inc*4
 1680 IF INKEY-98 x%(G)=x%(G)-inc
 1690 IF INKEY-67 x%(G)=x%(G)+inc
 1700 IF INKEY-73 y%(G)=y%(G)+inc
 1710 IF INKEY-105 y%(G)=y%(G)-inc
 1720 IF INKEY$0=CHR$32 fire=TRUE
 1730 ENDPROC
 1740 DEFPROCdart:GCOL3,2
 1750 MOVEx%(G),y%(G)-25:DRAWx%(G),y%(G)
+25
 1760 MOVEx%(G)-25,y%(G):DRAWx%(G)+25,y%
(G)
 1770 ENDPROC
 1780 DEFPROCdatainput
 1790 PRINT'"1/2 Players?"
 1800 REPEATA$=GET$
 1810 UNTILA$="1" OR A$="2"
 1820 VDU11:PRINTSPC(12):VDU11
 1830 FOR T%=1 TO VALA$:PRINT"Key/Joy >"
;T%
 1840 REPEATS$=GET$:UNTILS$="J" OR S$="K
"
 1850 joy(T%)=(S$="J"):VDU11
 1860 PRINTSPC(12):VDU11:NEXT
 1870 PRINT"Level (0-9)":REPEATS$=GET$
 1880 Lv%=VALS$+1:UNTIL Lv%>0 AND Lv%<11
 1890 VDU11,11:PRINTSPC(12):PRINT"(3)01
or (5)01"
 1900 REPEAT S%=GET-50:UNTILS%=1ORS%=3
 1910 VDU11:PRINTSPC(14);
 1920 IF S%=1 S%=301 ELSE S%=501
 1930 sc%(1)=S%:sc%(2)=S%
 1940 Lv%=Lv%*5:ENDPROC
 1950 DEFPROCboard
 1960 F=2:G=0:FORT=1 TO 20:A=F:F=G:G=A
 1970 GCOL0,3:READ NU:VDU5
 1980 PROCdraw(3,0,0):PRINT;NU
```

Turn to Page 143 ▶

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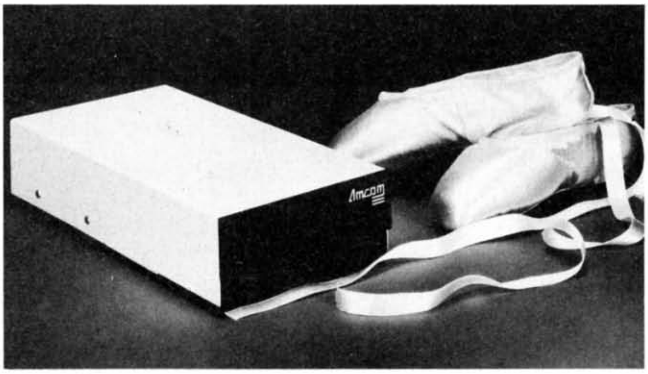
HALF HEIGHT WINCHESTERS



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35, Carters Lane
Kiln Farm
Milton Keynes
MK11 3HL
Tel: (0908) 569212

(Major credit cards accepted)

◀ From Page 140

```
 1990 FORlp%=1 TO 4 STEP 2
 2000 PROCdraw(1,T,lp%):PROCdraw(1,T-1,l
p%)
 2010 GCOL0,F+1:PLOT85,X,Y
 2020 PROCdraw(1,T,lp%+1):PROCdraw(1,T-1
,lp%+1)
 2030 GCOL0,G:PLOT85,X,Y:NEXT
 2040 FORlp%=1 TO 4:PROCdraw(1,T,lp%):GC
OL0,2
 2050 PROCdraw(2,T-1,lp%):NEXT
 2060 PROCdraw(1,T-1,5):PROCdraw(2,T-1,1
)
 2070 PROCdraw(1,T,5):PROCdraw(2,T,1):NE
XT
 2080 FORT=1 TO 20:PROCdraw(1,T,5):PROCd
raw(1,T-1,5)
 2090 GCOL0,3:PLOT85,X,Y:PROCdraw(1,T,6)
 2100 PROCdraw(1,T-1,6):GCOL0,1:PLOT85,X
,Y:NEXT
 2110 MOVE760,530:VDU5,255:MOVE760,520
 2120 VDU255:MOVE755,525:VDU255,4
 2130 GCOL0,2:MOVE832,399:DRAW886,293
 2140 GCOL0,3:MOVE955,333:DRAW971,317
 2150 GCOL0,0:MOVE875,413:DRAW951,336
 2160 ENDPROC
 2170 DEFPROCerror
 2180 IFERR=17 THEN RUN
 2190 VDU22,7:*FX4
 2200 REPORT:PRINT" at line ";ERL:END
 2210 DEFPROCinstruct:RESTORE 2550
 2220 FOR G%=0 TO 1:FOR H%=8 TO 22
 2230 READ A%:VDU31H%G%A%:NEXT
 2240 PRINT:NEXT
 2250 PRINTSPC8CHR$150STRING$(14,",")" "
CHR$130"By Chris Ewels"
 2260 PRINTCHR$134"Darts is a game for t
wo players, but"
 2270 PRINTCHR$134"the computer can play
 for one of them."
 2280 PRINTCHR$134"You take it in turn t
o throw 3 darts"
 2290 PRINTCHR$134"at a board. The first
 to reach zero"
 2300 PRINTCHR$134"from 301 or 501 is th
e winner. There"
 2310 PRINTCHR$134"are a few extra rules
 though:"
 2320 PRINTCHR$129"1. You must start and
 finish on a"
 2330 PRINTCHR$129SPC3"double or bull _
the outer ring or"
 2340 PRINTCHR$129SPC3"centre _ nothing
else counts."
 2350 PRINTCHR$129"2. You must not go be
low 0."
 2360 PRINTCHR$129"3. Any dart off the b
oard does not"
 2370 PRINTCHR$129SPC3"count."
 2380 PRINTCHR$131SPC4"The keys are as f
ollows:"
 2390 PRINTCHR$131SPC4"Left - Z"SPC7"Rig
ht - X"
 2400 PRINTCHR$131SPC4"Up    - :"SPC7"Dow
n  - /"
 2410 PRINTCHR$131SPC7"Throw dart - Spac
e"
 2420 PRINTCHR$135"The game level contro
ls the amount of"
 2430 PRINTCHR$135"hand shake your playe
r has, as well as"
 2440 PRINTCHR$135"the skill of the comp
uter."
 2450 PRINTTAB(5,24);:VDU132,157,135
 2460 PRINT"Press SPACE to start"SPC2;
 2470 VDU156:ENDPROC
 2480 DATA20,1,18,4,13,6,10,15,2,17,3,19
,7,16,8,11,14,9,12,5
 2490 DATA"Double or&&&&","bull to start
"
 2500 DATA"Double or&&&&","bull to stop&
"
 2510 DATA"Missed the&&&","board&&&&&&&&
"
 2520 DATA"You have&&&&&","gone bust.&&&
"
 2530 DATA"You hit the&&","wire&&&&&&&&&
"
 2540 DATA"&&&&&&&&&&&&&","&&&&&&&&&&&&&
"
 2550 DATA 148,235,233,32,246,180,32,247
,181,32,235,161,32,230,177
 2560 DATA 147,250,186,32,181,181,32,181
,233,32,234,32,32,240,186
 2570 DATA450,420,280,250,55,25
 2580 DEFPROCreloc(Q%)
 2590 IF Q%>=PAGE THEN ENDPROC
 2600 P%=PAGE:L%=TOP-PAGE:*TAPE
 2610 VDU129,136:PRINT"Relocating..."
 2620 FOR M%=0 TO L%-1 STEP4:Q%!M%=P%!M%
 2630 SOUND&11,-7,255*M%/L%,1:NEXT
 2640 PAGE=Q%:*FX138,0,128
 2650 *K.0OLD|MRUN|M
 2660 END
```

This listing is included in this month's tape & disc offer. See order form on Page 159.

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 24A2 2
  50 = 9621 0
  60 = 1092 2
  70 = DEBB 9
  80 = 645E 0
  90 = 2B9E A
 100 = FE69 E
 110 = F716 4
 120 = 608B 3
 130 = 24DD E
 140 = 4A86 3
 150 = 730C 0
 160 = F186 7
 170 = 4F1E 1
 180 =  63C 8
 190 = 41B6 4
 200 =  46D E
 210 = 747B E
 220 = D3BB 8
 230 = 2E9E 1
 240 = B027 A
 250 = 2C83 8
 260 = 3CF6 5
 270 = 3E8C D
 280 = 111B 6
 290 = F362 3
 300 = C34C 1
 310 = A73A C
 320 = BBD6 9
 330 = 2621 4
 340 = FB93 9
 350 = CE43 F
 360 = 5057 7
 370 = 165F 8
 380 = 1485 D
 390 = 49EC A
 400 = CB7C D
 410 = 52AE 8
 420 = 4A9F 2
 430 = C045 9
 440 = 41CC C
 450 = 4179 6
 460 = BCDB 3
 470 = 60EE F
 480 = EC6D 4
 490 = 10D8 A
 500 = B43E A
 510 = EC6D 8
 520 = 7B0D 4
 530 = DF93 F
 540 =   7A 9
 550 = 3FC1 2
 560 = 6CDF 4
 570 = D15B 6
 580 = 2C83 5
 590 = 74E4 5
 600 = 1D07 D
 610 = 78E5 9
 620 = 2936 4
 630 = 2C83 C
 640 = F55E D
 650 = 811F 5
 660 = C168 7
 670 = 9CE5 6
 680 = ED0F 2
 690 = E549 2
 700 = 2070 9
 710 = EAE3 B
 720 = 2C83 D
 730 = 14DA 6
 740 = 9307 5
 750 = 8E4F C
 760 =  7B4 3
 770 = 8D64 5
 780 = ED37 5
 790 = A1CC 5
 800 = 66F2 3
 810 =  A47 C
 820 = A211 A
 830 = 5B3C 2
 840 = 608B 6
 850 = 2CFE 5
 860 = D0D0 A
 870 = A1C1 8
 880 = EDF5 9
 890 = 9648 F
 900 = 90BB D
 910 =  97B 7
 920 = 2E32 7
 930 = 34E2 8
 940 = DC5E 1
 950 = 41FF E
 960 = F2D3 0
 970 = AEC1 F
 980 = ED0F 7
 990 = 6558 1
1000 = 60C8 7
1010 = B281 5
1020 = E4DE 7
1030 = 7D1B D
1040 = 794A E
1050 = 9412 2
1060 = BFAA 6
1070 = EDF4 8
1080 = F50D 4
1090 =  685 2
1100 = 7B0D E
1110 = FF16 8
1120 = 2C83 A
1130 = ED0F 6
1140 = E797 D
1150 = 2C8E 0
1160 = 4028 2
1170 = 8CF0 F
1180 =  1FB 9
1190 = 974C 2
1200 = B389 2
1210 = 724D D
1220 = DEE7 F
1230 = BC47 5
1240 = 9C19 6
1250 = 3974 D
1260 = 1B62 7
1270 = 1A58 D
1280 = 2412 8
1290 = A514 2
1300 = 94D9 2
1310 = 7342 E
1320 = 4396 B
1330 = D1E6 1
1340 = EAF0 3
1350 = AE10 A
1360 = 48E1 B
1370 = 985A E
1380 = ED0F B
1390 = CCBD 8
1400 = DA84 1
1410 = CC1D A
1420 = 380A A
1430 =  52C A
1440 =  137 2
1450 = 77D3 B
1460 = ED0F E
1470 = BD8F 3
1480 = F716 9
1490 = 674B E
1500 = B262 1
1510 = 4AD5 A
1520 = AF00 C
1530 = B623 A
1540 = 6294 2
1550 = 6AA9 8
1560 = 67C7 A
1570 = BFCA C
1580 = 2FB6 4
1590 = 92EB 0
1600 = 8656 3
1610 = C8E1 F
1620 = C173 4
1630 = ED0F 8
1640 = 25C7 2
1650 = 2E96 2
1660 = 2076 3
1670 = 384A B
1680 = 69E5 4
1690 = BA78 A
1700 = 4C1E D
1710 = 153C E
1720 = 82F4 7
1730 = ED0F 3
1740 = 7FBF 7
1750 = 3EAB 9
1760 = 16F1 2
1770 = ED0F F
1780 = FCDC B
1790 = 3180 D
1800 = 6BF3 7
1810 = EBDA 4
1820 = D273 A
1830 = E1EE D
1840 = E087 3
1850 = 3444 0
1860 = A740 C
1870 = 4D27 A
1880 = F507 0
1890 = C6B7 D
1900 = 256F 0
1910 = 9FB5 5
1920 =  7F0 3
1930 = E8D4 2
1940 = C152 E
1950 = 8FB9 A
1960 = F655 9
1970 = 8C1F 6
1980 = 377C D
1990 = 97B4 1
2000 = 5657 C
2010 = 33EB C
2020 = F026 C
2030 = C614 D
2040 = DF55 4
2050 = EFD1 2
2060 = B9D4 5
2070 = 8627 E
2080 = 4904 0
2090 = 1C67 6
2100 = DE63 E
2110 = 6D80 4
2120 = FFAF 6
2130 = E1D7 E
2140 = 43D6 B
2150 = 81D0 8
2160 = ED0F 4
2170 = D7A7 3
2180 = 5CFF 4
2190 = 92B4 3
2200 = FA32 B
2210 = E311 B
2220 = 9577 6
2230 = C7BD 2
2240 = 12BF C
2250 = 4869 9
2260 = EEF9 2
2270 = 1BD1 4
2280 = 9F89 1
2290 = 2539 5
2300 = DAF9 8
2310 = 8C6F 8
2320 = 3008 3
2330 = E272 6
2340 = 9227 3
2350 = 7151 7
2360 = 102E 5
2370 = 3BDC C
2380 = 91DA D
2390 = 158A 6
2400 = 6F10 B
2410 = 71AC 8
2420 = A2F6 8
2430 = 7A4F 2
2440 = 7A00 5
2450 = B318 6
2460 = AD77 2
2470 =  87C 3
2480 = 9F85 F
2490 = CFE6 F
2500 = 6B01 C
2510 = 3CCB A
2520 = C5C2 B
2530 = 6F7B B
2540 = E9DF F
2550 = 9A27 B
2560 = 62AF 5
2570 = E91B 1
2580 = E508 0
2590 = 1DBB D
2600 = 5CDD 2
2610 = 75CB 5
2620 =  77D B
2630 = 9C35 0
2640 = FCB8 0
2650 = 1080 6
2660 = FD2E B
```

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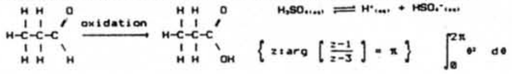
oxidation
H₂SO₄(aq) ⇌ H⁺(aq) + HSO₄⁻(aq)
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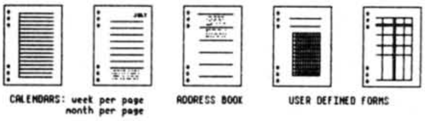

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Robin Nixon continues his exploration into ways of adding new commands to BBC Basic

Keyword capers

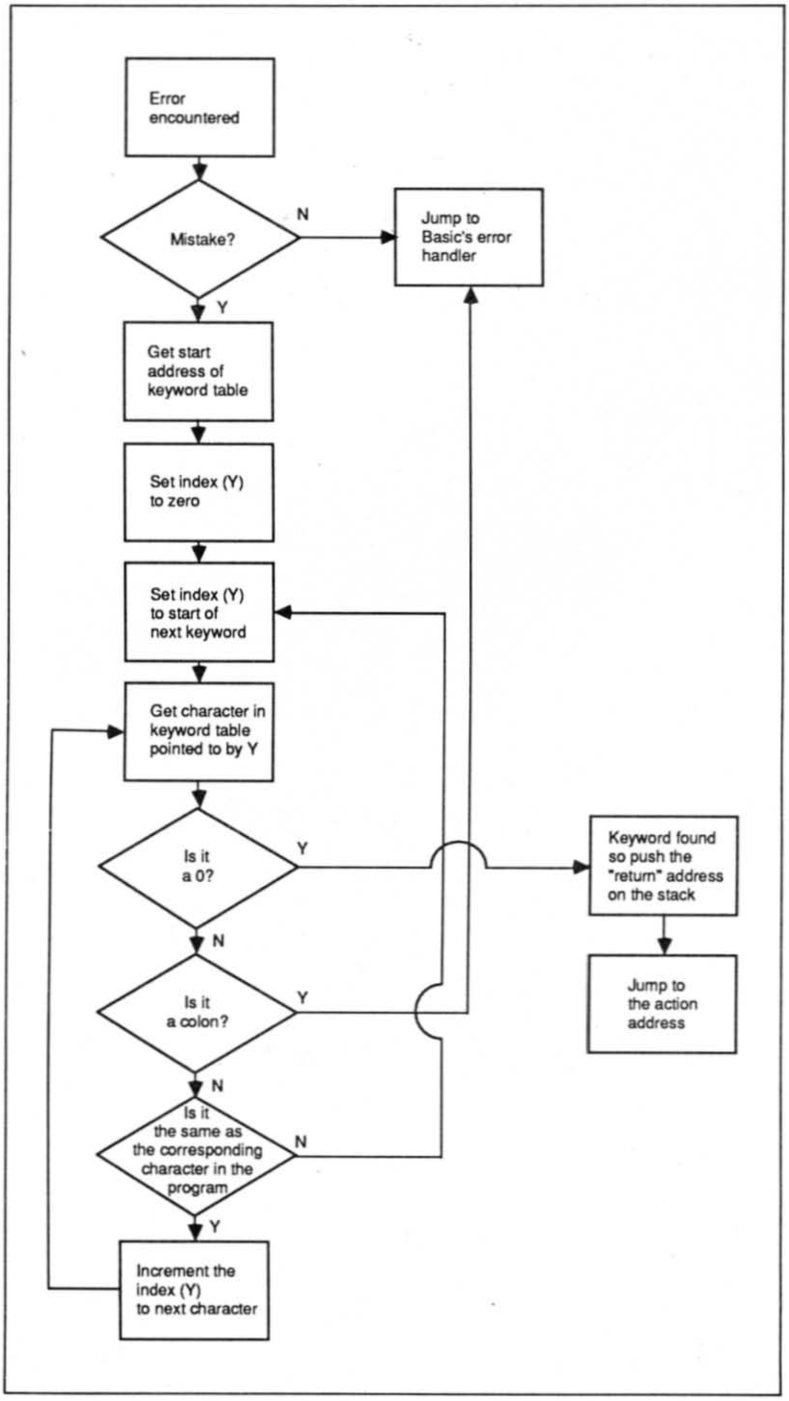
Error encountered
Mistake?
N
Jump to Basic's error handler
Y
Get start address of keyword table
Set index (Y) to zero
Set index (Y) to start of next keyword
Get character in keyword table pointed to by Y
Is it a 0?
Y
Keyword found so push the "return" address on the stack
Jump to the action address
N
Is it a colon?
Y
N
Is it the same as the corresponding character in the program
N
Y
Increment the index (Y) to next character

Figure I: Flowchart of the way ABC checks for a keyword match

WE looked last month at how to intercept the BBC Micro's Basic error handling routine to check for the new keyword B, for BEEP. Now let's take this process one step further by adding more than one new keyword and allowing them to be as many characters long as we like.

To recap, in getting the BBC Micro to recognise B as a keyword we intercepted the break vector – BRK – stored at locations &202 and &203, and checked all errors coming through for Mistake. If an error was Mistake we then checked to see whether or not it was caused by our new keyword.

If you look at Program I, Added Basic Commands – ABC – you will see that up to just before *comploop* at line 1240 it is virtually identical to the program Beep from the last article. The differences begin at line 1170, where we store the location of the start of our new keyword table.

So before we go any further let's have a quick look at this table, lines 1760 – 2000. The table follows the format:

New keyword
Zero byte
Action address
New keyword
Zero byte
Action address
...
...
End marker

Each of the new keywords is followed by a zero byte so that we can recognise its end when checking for a match. The action address points to where the keyword's corresponding routine starts. If the table end marker is reached while checking, it tells ABC that the Mistake error was not caused by one of our new keywords.

Character 58 has been chosen for the table end marker because it is a colon and, being a statement separator, cannot be used as part of a variable or keyword.

Right, back to *comploop*. Line 1240 sets register Y to zero. This will be used as our offset into words in the keyword table which are being checked. This restricts us to a table of only 256 bytes, but in practise this won't be too limiting.

Lines 1280 to 1350 check through a keyword until a match has been found. If

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◀ **From Page 145**

zero is encountered we have a match, so line 1290 branches to *found*.

Line 1300 checks whether we've tested all the keywords, and if so line 1310 branches to *notcommand* which exits to Basic's own error handler. Otherwise lines 1390 to 1440 call *incmatch*, at lines 1630 – 1720, which increments our pointer into the keyword table to point to the start of the next keyword, and then jumps back into *comploop* to continue checking for a match.

If we've reached line 1480 we must have found a match and the Mistake message was caused by one of our new keywords. So we store the contents of register Y, which now contains the length of the keyword, in *offset*. You will see later how this is used to increment the Basic interpreter's pointer into the program.

Then line 1490 increments Y to point to the low byte of the keyword's action address and lines 1500 and 1510 store it in *acadd1*. Likewise, lines 1520 to 1540 store the high byte in *acadd2*.

Now for a bit of slightly devious programming. As you may know, when a JSR (Jump to Sub-Routine) is encountered the location of the next instruction following the JSR is pushed on to the 6502's stack so that the processor knows where to continue execution once the subroutine has been completed.

If we push our own return address on to the stack and simply JMP to a subroutine the processor will resume execution at the address it finds on the stack.

Lines 1550 to 1590 load the low and high bytes of:

```
quit-1
```

and push them on to the stack. The −1 is there because, after an RTS instruction, the 6502 increments the program counter to point to the next instruction. This means that once a keyword subroutine has been executed the RTS at the end will force the processor to jump to *quit* which will then tidily leave ABC.

Having pushed this address on the stack, line 1590 jumps to the location stored in *acadd1* and *acadd2* which, as you'll recall, is where we stored the action address of the keyword.

Before we examine the coding of the new keywords let's have a look at *quit* – line 3370.

Lines 3370 to 3410 take the contents of *offset*, the length of the keyword, and update the program pointer, *PTRA*, to the byte following the keyword. So that when we return execution back to the Basic interpreter it does not encounter our keyword again.

As in Beep, line 3420 moves *PTRA* to the next statement separator or program line, lines 3430 to 3510 pull unwanted error handling information from the stack, and line 3520 passes control back to the interpreter.

We should now be ready to look at the new keyword routines. Lines 2040 to 2060 are the old familiar beep. Lines 2100 to 2740 swap the contents of two integer variables.

Lines 2100 to 2180 strip any spaces between SWAP and the first variable. Lines 2220 to 2260 get the first variable name and puts it in *vname1* then lines 2270 to 2350 put the second variable name in *vname2*. After that lines 2360 to 2530 call *swap1* between lines 2580 and 2740, which swaps the contents of the two variables held in page 4. Line 2540, RTS, returns using the address we pushed on the stack earlier.

The routine *zeroloop*, lines 2830 to 2870, simply sets the values of all system integer variables to zero.

At lines 2910 to 3110, *inverse* and *normal* swap the text foreground and background colours using VDU 17 and set it back to normal respectively.

The *frame* routine, lines 3150 to 3170, does a *FX19 which causes the computer to wait until the screen scanning electron beam flies back to the top left hand side of the screen. This helps to eliminate flicker during animation but slows programs down.

Finally, *scron* and *scroff* turn screen output on and off by doing *FX3,2 for screen off or *FX3,0 for screen on.

When you've finished typing in the listing, I suggest you save it as ABC-SRC before running it. It automatically saves the assembled object code as ABC when it is run.

If you have a cassette-based micro, change the value of *P%* in line 240 to &B00 if you don't need the function key definitions, or &C00 if you have no user defined characters. Then replace line 3560 with either CALL &B00 or CALL &C00.

Command	**Action**
BEEP	Causes a beep using VDU 7.
SWAP ?%,?%	Swaps the contents of two integer variables.
ZEROINT	Clears the values of all integer variables to zero.
INVERSE	Inverses the foreground and background text colours.
NORMAL	Restores the foreground and background text colours.
FRAME	Waits for a frame fly-back before updating the screen.
SCROFF	Turns off output to the screen.
SCROFF	Turns on output to the screen.

Table I: Extra keywords provided by ABC

Program I

```
100 REM *****************
110 REM *               *
120 REM *      ABC      *
130 REM *  Added Basic  *
140 REM *   Commands    *
150 REM *  Robin Nixon  *
160 REM * (c) Copyright *
170 REM *The Micro User *
180 REM *               *
190 REM *****************
200 REM
210 MODE 7
220 PROCinit
230 FOR PASS=0 TO 3 STEP3
240 P%=&900
250 [
260 OPT PASS
270 \
280 .start
290 \
300 LDA basic
310 CMP &8015
320 BEQ vectors
330 LDX #0
340 \
350 .errloop
360 \
370 LDA errmess,X
380 BEQ enderr
  390 JSR oswrch
  400 INX
  410 JMP errloop
  420 \
  430 .errmess
  440 \
  450 OPT FNequs(CHR$13+CHR
$10+"This utility is for Ba
sic"+CHR$32)
  460 \
  470 .basic
  480 \
  490 OPT FNequb(B%+48)
  500 OPT FNequs(CHR$32+"on
ly!"+CHR$10+CHR$13+CHR$0)
  510 \
520 .enderr
530 \
540 RTS
550 \
560 .vectors
570 \
580 LDA &202
590 LDX &203
600 CMP #main MOD &100
610 BNE changebrkvector
620 CPX #main DIV &100
630 BEQ alreadychanged
640 \
650 .changebrkvector
660 \
670 STA newbrk1
680 STX newbrk2
690 LDA #main MOD &100
700 STA &202
710 LDA #main DIV &100
720 STA &203
730 \
740 .alreadychanged
750 \
760 RTS
770 \
780 .main
790 \
800 PHP
810 PHA
820 TYA
830 PHA
840 TXA
850 PHA
860 LDY #0
870 LDA (&FD),Y
880 CMP #4
890 BEQ checkcommand
900 \
910 .notcommand
920 \
930 PLA
940 TAX
950 PLA
960 TAY
970 PLA
980 PLP
990 JMP (newbrk1)
1000 \
1010 .checkcommand
1020 \
1030 LDA &A
1040 CLC
1050 ADC &B
1060 STA ptra1
1070 LDA &C
1080 ADC #0
1090 STA ptra2
1100 SEC
1110 LDA ptra1
1120 SBC #1
1130 STA ptra1
1140 LDA ptra2
1150 SBC #0
1160 STA ptra2
1170 LDA #keytable MOD&100
1180 STA keytab1
1190 LDA #keytable DIV&100
1200 STA keytab2
1210 \
1220 .comploop
1230 \
1240 LDY #0
1250 \
1260 .comploop1
1270 \
1280 LDA (keytab1),Y
1290 BEQ found
1300 CMP #58
1310 BEQ notcommand
1320 CMP (ptra1),Y
1330 BNE next
1340 INY
1350 JMP comploop1
1360 \
1370 .next
1380 \
1390 JSR incmatch
1400 BNE next
1410 JSR incmatch
1420 JSR incmatch
1430 JSR incmatch
1440 JMP comploop
1450 \
1460 .found
1470 \
1480 STY offset
1490 INY
1500 LDA (keytab1),Y
1510 STA acadd1
1520 INY
1530 LDA (keytab1),Y
1540 STA acadd2
1550 LDA #(quit-1) DIV&100
1560 PHA
1570 LDA #(quit-1) MOD&100
1580 PHA
1590 JMP (acadd1)
1600 \
1610 .incmatch
1620 \
1630 LDA keytab1
1640 CLC
1650 ADC #1
1660 STA keytab1
1670 LDA keytab2
1680 ADC #0
1690 STA keytab2
1700 LDY #0
1710 LDA (keytab1),Y
1720 RTS
1730 \
1740 .keytable
1750 \
1760 OPT FNequs ("BEEP")
1770 OPT FNequb(0)
1780 OPT FNequw(beep)
1790 OPT FNequs("SWAP")
1800 OPT FNequb(0)
1810 OPT FNequw(swap)
1820 OPT FNequs("ZEROINT")
1830 OPT FNequb(0)
1840 OPT FNequw(zeroint)
1850 OPT FNequs("INVERSE")
1860 OPT FNequb(0)
1870 OPT FNequw(inverse)
1880 OPT FNequs("NORMAL")
1890 OPT FNequb(0)
1900 OPT FNequw(normal)
1910 OPT FNequs("FRAME")
1920 OPT FNequb(0)
1930 OPT FNequw(frame)
1940 OPT FNequs("SCRON")
1950 OPT FNequb(0)
1960 OPT FNequw(scron)
1970 OPT FNequs("SCROFF")
1980 OPT FNequb(0)
1990 OPT FNequw(scroff)
2000 OPT FNequb(58)
2010 \
2020 .beep
2030 \
2040 LDA #7
2050 JSR oswrch
2060 RTS
2070 \
2080 .swap
2090 \
2100 LDY offset
2110 \
2120 .swap0
2130 \
2140 LDA (ptra1),Y
2150 CMP #32
2160 BNE first
2170 INY
2180 JMP swap0
2190 \
2200 .first
2210 \
2220 SEC
2230 SBC #64
2240 ASL A
2250 ASL A
2260 STA vname1
2270 INY
2280 INY
2290 INY
2300 LDA (ptra1),Y
2310 SEC
2320 SBC #64
2330 ASL A
2340 ASL A
2350 STA vname2
2360 INY
2370 INY
2380 STY offset
2390 LDA vname1
2400 STA swap2+1
2410 LDA #&74
2420 STA swap3+1
2430 JSR swap1
2440 LDA vname2
2450 STA swap2+1
2460 LDA vname1
2470 STA swap3+1
2480 JSR swap1
2490 LDA #&74
2500 STA swap2+1
2510 LDA vname2
2520 STA swap3+1
2530 JSR swap1
2540 RTS
2550 \
2560 .swap1
2570 \
2580 LDY #0
2590 \
2600 .swap2
2610 \
2620 LDA &400,Y
2630 \
2640 .swap3
2650 \
2660 STA &400,Y
2670 CPY #3
2680 BEQ swapdone
2690 INY
2700 JMP swap2
2710 \
2720 .swapdone
2730 \
2740 RTS
2750 \
2760 .zeroint
2770 \
2780 LDA #0
2790 LDY #4
2800 \
2810 .zeroloop
2820 \
2830 STA &400,Y
2840 INY
2850 CPY #&6C
2860 BNE zeroloop
2870 RTS
2880 \
2890 .inverse
2900 \
2910 LDA #17
2920 JSR oswrch
2930 LDA #0
2940 JSR oswrch
2950 LDA #17
2960 JSR oswrch
2970 LDA #135
2980 JSR oswrch
2990 RTS
3000 \
3010 .normal
3020 \
3030 LDA #17
3040 JSR oswrch
3050 LDA #7
3060 JSR oswrch
3070 LDA #17
3080 JSR oswrch
3090 LDA #128
3100 JSR oswrch
3110 RTS
3120 \
3130 .frame
3140 \
3150 LDA #19
3160 JSR osbyte
3170 RTS
3180 \
3190 .scron
3200 \
3210 LDA #3
3220 LDX #0
3230 LDY #0
3240 JSR osbyte
3250 RTS
3260 \
3270 .scroff
3280 \
3290 LDA #3
3300 LDX #2
3310 LDY #0
3320 JSR osbyte
3330 RTS
```

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MicroLink

Turn to Page 148 ▶

◄ From Page 147

```
3340 \
3350 .quit
3360 \
3370 DEC offset
3380 LDA offset
3390 CLC
3400 ADC &A
3410 STA &A
3420 JSR checkend
3430 PLA
3440 PLA
3450 PLA
3460 PLA
3470 PLA
3480 PLA
3490 PLA
3500 PLA
3510 PLA
3520 JMP continue
3530 ]
3540 NEXT
3550 PRINT " *SAVE ABC ";S
TR$~start;" ";STR$~P%
3560 CALL &900
3570 END
3580 DEFPROCinit
3590 oswrch =&FFEE
3600 osbyte =&FFF4
3610 newbrk1=&70
3620 newbrk2=&71
3630 vname1 =&72
3640 vname2 =&73
3650 ptra1  =&80
3660 ptra2  =&81
3670 keytab1=&82
3680 keytab2=&83
3690 acadd1 =&84
3700 acadd2 =&85
3710 offset =&86
3720 B%=(?&8015)-48:IF B%<
1 OR B%>6 GOTO 4060 ELSE ON
 B% GOTO 3760,3820,3880,3940,4060,4000
3730 REM
3740 REM ** Basic 1
3750 REM
3760 checkend=&9810
3770 continue=&8B0C
3780 ENDPROC
3790 REM
3800 REM ** Basic 2
3810 REM
3820 checkend=&9857
3830 continue=&8B9B
3840 ENDPROC
3850 REM
3860 REM Basic 3 Hi Basic
3870 REM
3880 checkend=&D07C
3890 continue=&C398
3900 ENDPROC
3910 REM
3920 REM Basic 4 Master
3930 REM
3940 checkend=&9BA6
3950 continue=&9005
3960 ENDPROC
3970 REM
3980 REM Basic 6 Compact
3990 REM
4000 checkend=&9BA6
4010 continue=&8998
4020 ENDPROC
4030 REM
4040 REM Unknown Basic
4050 REM
4060 CLS:PRINT"This micro
is not running a compatible
 Basic":END
4070 DEFFNequs(string$)
4080 $P%=string$
4090 P%=P%+LEN(string$)
4100 =PASS
4110 DEFFNequb(byte)
4120 ?P%=byte
4130 P%=P%+1
4140 =PASS
4150 DEFFNequw(word)
4160 ?P%=word MOD &100
4170 P%?1=word DIV &100
4180 P%=P%+2
4190 =PASS
```

Get it right!

```
100 =    0 0
110 =    0 0
120 =    0 0
130 =    0 0
140 =    0 0
150 =    0 0
160 =    0 0
170 =    0 0
180 =    0 0
190 =    0 0
200 =    0 0
210 = 1092 2
220 = DEBB 6
230 = E856 F
240 = C92F 3
250 = EB9E 5
260 = D5D8 8
270 =    0 8
280 = 3208 1
290 =    0 1
300 = 5DE7 7
310 = F45A F
320 = 1922 7
330 = EA45 7
340 =    0 7
350 = 7C24 F
360 =    0 F
370 = 9EB4 3
380 = 7FFF F
390 = 9224 B
400 = 7602 F
410 = 52DB C
420 =    0 C
430 = BB2C 9
440 =    0 9
450 = 29F8 0
460 =    0 0
470 = ABBD 2
480 =    0 2
490 = 5226 1
500 = 9A59 D
510 =    0 D
520 = 4545 C
530 =    0 C
540 = 9843 B
550 =    0 B
560 = 343B 3
570 =    0 3
580 = 74DF D
590 = 3698 E
600 = 9253 D
610 = 54D2 7
620 = AEF9 E
630 = F559 A
640 =    0 A
650 = C9FD 4
660 =    0 4
670 = F990 5
680 = 58D1 F
690 = DF66 8
700 = A7D2 C
710 = 5426 0
720 = B7F3 6
730 =    0 6
740 = 23C3 A
750 =    0 A
760 = 9843 E
770 =    0 E
780 = 37C9 2
790 =    0 2
800 = 805E 2
810 = 824E 0
820 = 6ECC 2
830 = 824E B
840 = 5DFD B
850 = 824E F
860 = 9CF1 D
870 =  A93 3
880 = 427D 0
890 = 9425 3
900 =    0 3
910 = 55DE 4
920 =    0 4
930 = 4E8A 6
940 = 670E 8
950 = 4E8A E
960 = 772F D
970 = 4E8A 3
980 = 4C9A 2
990 = FB1D 6
1000 =    0 6
1010 = 553B 0
1020 =    0 0
1030 = 93D6 F
1040 = 74FB D
1050 =   9E F
1060 = 88EC A
1070 = B394 4
1080 = A1BE 5
1090 = B88F 3
1100 = 8D00 4
1110 = 7EF2 D
1120 = EDDE A
1130 = 88EC 9
1140 = 4E91 2
1150 = FDFF 8
1160 = B88F C
1170 = B7F4 C
1180 = D30A A
1190 = F377 C
1200 = E369 B
1210 =    0 B
1220 = 6051 F
1230 =    0 F
1240 = 9CF1 8
1250 =    0 8
1260 = 1BD4 A
1270 =    0 A
1280 = 2761 E
1290 = 2EB4 6
1300 = 91EC A
1310 = 28A2 6
1320 = B97D 3
1330 = 8347 8
1340 = 6623 B
1350 = 20CD 8
1360 =    0 8
1370 = F3EC 8
1380 =    0 8
1390 = 52EE E
1400 = 8347 8
1410 = 52EE 7
1420 = 52EE 7
1430 = 52EE 8
1440 = 5AFD 4
1450 =    0 4
1460 = DB31 4
1470 =    0 4
1480 = 408D E
1490 = 6623 2
1500 = 2761 7
1510 = 7C99 A
1520 = 6623 C
1530 = 2761 C
1540 = 4CFA 8
1550 = AD5F F
1560 = 824E 7
1570 = E9DC F
1580 = 824E 4
1590 = F5FC 4
1600 =    0 4
1610 = B08F F
1620 =    0 F
1630 = 9992 F
1640 = 74FB D
1650 = B19F 0
1660 = D30A 5
1670 = A9F1 4
1680 = A1BE 0
1690 = E369 1
1700 = 9CF1 1
1710 = 2761 6
1720 = 9843 5
1730 =    0 5
1740 = 74F6 4
1750 =    0 4
1760 = B35D 6
1770 = 65D9 D
1780 = 2C6E 6
1790 = ACEB 2
1800 = 65D9 E
1810 = A86A B
1820 = EE18 8
1830 = 65D9 A
1840 = D4AA F
1850 = BF1E E
1860 = 65D9 0
1870 = 1E83 4
1880 = 4D4E B
1890 = 65D9 4
1900 = 1425 1
1910 = C7D0 8
1920 = 65D9 3
1930 = D8E8 0
1940 = 2139 2
1950 = 65D9 8
1960 = 1D87 E
1970 = A69A 9
1980 = 65D9 D
1990 = 4584 1
2000 = 8BFA 8
2010 =    0 8
2020 = 8975 6
2030 =    0 6
2040 = 7272 2
2050 = 9224 E
2060 = 9843 3
2070 =    0 3
2080 =  5A1 E
2090 =    0 E
2100 = D154 1
2110 =    0 1
2120 = C7F6 2
2130 =    0 2
2140 = ED86 B
2150 = 9A00 B
2160 = CBB1 5
2170 = 6623 D
2180 = BD37 D
2190 =    0 D
2200 = 1E26 3
2210 =    0 3
2220 = 8D00 E
2230 = 1DC3 0
2240 = 6311 3
2250 = 6311 D
2260 = 2286 4
2270 = 6623 C
2280 = 6623 8
2290 = 6623 3
2300 = ED86 D
2310 = 8D00 7
2320 = 1DC3 D
2330 = 6311 B
2340 = 6311 4
2350 = 12E5 9
2360 = 6623 9
2370 = 6623 B
2380 = 408D E
2390 = B35F 1
2400 = 9A54 1
2410 = AE68 1
2420 = AD64 3
2430 = 6E50 6
2440 = 833C A
2450 = 9A54 0
2460 = B35F 5
2470 = AD64 4
2480 = 6E50 9
2490 = AE68 0
2500 = 9A54 9
2510 = 833C B
2520 = AD64 B
2530 = 6E50 3
2540 = 9843 7
2550 =    0 7
2560 = D7D7 B
2570 =    0 B
2580 = 9CF1 0
2590 =    0 0
2600 = E7B4 D
2610 =    0 D
2620 = D5BD A
2630 =    0 A
2640 = F795 5
2650 =    0 5
2660 = 4464 B
2670 = E4CD 9
2680 = EA79 7
2690 = 6623 3
2700 = 9D75 A
2710 =    0 A
2720 =  6B6 3
2730 =    0 3
2740 = 9843 5
2750 =    0 5
2760 = 49BA 8
2770 =    0 8
2780 =  295 A
2790 = DC75 A
2800 =    0 A
2810 = 4986 8
2820 =    0 8
2830 = 4464 C
2840 = 6623 E
2850 = AB90 9
2860 = 469E D
2870 = 9843 B
2880 =    0 B
2890 = 40E1 C
2900 =    0 C
2910 = C0C7 7
2920 = 9224 8
2930 =  295 F
2940 = 9224 0
2950 = C0C7 2
2960 = 9224 9
2970 = B47E B
2980 = 9224 7
2990 = 9843 0
3000 =    0 0
3010 = 1CF6 0
3020 =    0 0
3030 = C0C7 B
3040 = 9224 0
3050 = 7272 1
3060 = 9224 3
3070 = C0C7 E
3080 = 9224 D
3090 = 56E2 E
3100 = 9224 6
3110 = 9843 3
3120 =    0 3
3130 = 23C1 D
3140 =    0 D
3150 = 2109 C
3160 = 8E7E 7
3170 = 9843 B
3180 =    0 B
3190 = A4E5 F
3200 =    0 F
3210 = 32F6 0
3220 = EA45 1
3230 = 9CF1 1
3240 = 8E7E 9
3250 = 9843 7
3260 =    0 7
3270 = 95A7 1
3280 =    0 1
3290 = 32F6 B
3300 = CA07 1
3310 = 9CF1 7
3320 = 8E7E 0
3330 = 9843 D
3340 =    0 D
3350 = 4F84 4
3360 =    0 4
3370 = DCF4 9
3380 = F23A 2
3390 = 74FB 7
3400 = 30FD 5
3410 = 480B C
3420 = 8BD6 5
3430 = 4E8A 9
3440 = 4E8A A
3450 = 4E8A 7
3460 = 4E8A 4
3470 = 4E8A F
3480 = 4E8A A
3490 = 4E8A A
3500 = 4E8A 7
3510 = 4E8A 0
3520 = 3842 6
3530 = 8B58 E
3540 = 2C83 4
3550 = 7EA2 9
3560 = 59C4 0
3570 = FD2E B
3580 = 344C 5
3590 = 24BA D
3600 = 8CD9 8
3610 = 7903 E
3620 = 87F0 D
3630 = F360 E
3640 = 2DA1 1
3650 = 29C7 4
3660 = E164 F
3670 = A962 C
3680 = 5791 8
3690 = 964B 2
3700 = 488A 5
3710 = FD74 D
3720 = BC0B 7
3730 =    0 7
3740 =    0 7
3750 =    0 7
3760 = 25B9 4
3770 = 10F5 F
3780 = ED0F E
3790 =    0 E
3800 =    0 E
3810 =    0 E
3820 = 999A D
3830 = BA4C C
3840 = ED0F 0
3850 =    0 0
3860 =    0 0
3870 =    0 0
3880 = 13B9 2
3890 = D6C3 2
3900 = ED0F 9
3910 =    0 9
3920 =    0 9
3930 =    0 9
3940 = 52EF D
3950 = CE78 A
3960 = ED0F D
3970 =    0 D
3980 =    0 D
3990 =    0 D
4000 = 52EF 4
4010 = 4D68 5
4020 = ED0F 0
4030 =    0 0
4040 =    0 0
4050 =    0 0
4060 = 4C67 7
4070 = AF54 D
4080 = 4776 9
4090 = C308 7
4100 = 4348 F
4110 = 54B0 3
4120 = 24A9 F
4130 = 5569 B
4140 = 4348 5
4150 = 80CE 6
4160 = 8DBD 0
4170 = B3CD 5
4180 = 650A 0
4190 = 4348 0
```

contex

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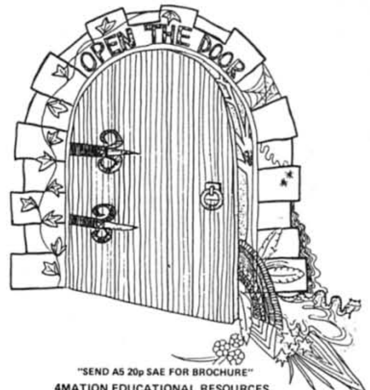

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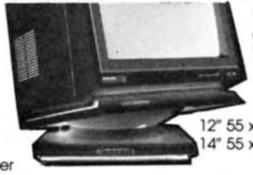

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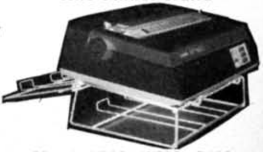

80 col H100 W310 D610mm
132 col H100 W430 D610mm

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LETTERS

£10 Prize letter

Nip the minus bug in the bud

IN Basic the minus sign can be used in two ways: Either it turns some number or variable into its negative value – the unary minus – or it subtracts one value from another.

As Basic is supposed to take arithmetic operator precedence into account, the raising to a power should take precedence over the minus sign.

For example -7^2 *should be* $-(7x7)= -49$*, whereas* $(-7)^2$ *should yield* $(-7x7)=49$*.*

Instead, the micro returns values as follows:

```
PRINT -7^2
```

gives 49 instead of –49 and even:

```
PRINT -(7)^2
```

prints 49.

If the number 7 from above is replaced by a variable it doesn't make any difference.

The equation y=–x^2 behaves as y=x^2.

To solve this problem use –1 or 0– instead of the leading minus. This applies also to other languages calling the computational mathematical routines from Basic II such as Comal.*

Also if INKEY is used with negative argument it is supposed to look for a particular key pressed down. For example:

```
10 REPEAT
20 IF INKEY-69 PRINT"Hit!"
30 UNTIL FALSE
```

should scan the pressing of the Y key. However, if the 6, U and J keys are pressed simultaneously they perform equally.

In this case the three keys together form a switching circuit making the connection between the keyboard matrix's row and column where the Y key is expected.

The Mos masks out the bit pattern read from the columns, thereby missing the diversion. Other combinations for the Y are 60K, 6RF, HNJ, FGH and HKL.

Because this bug concerns the OS1.20 and all normal keys, it applies to all languages and programs using the osbyte &79 routine – including Comal, Pascal, and Logo.

This shortcoming should be observed in educational programs especially as children grapple with the keyboard more than adults. – **Arthur Visser, Netherlands.**

Archimedes critics unfair to Acorn

I WOULD like to defend Acorn against unfair remarks that have been made against it. Many people have said that the Archimedes range is overpriced and – if Acorn doesn't cut its prices – it will fall prey to cheaper, inferior pieces of plastic which go under the assumed name of micros.

Well, what do they want: A free Archimedes with four tokens from a cereal packet? Acorn has produced a micro that runs at four mips for under a £1000 – what other computer can offer that even at three times the price?

Many people compare the Archimedes to cheaper micros with a megabyte of memory. Though pound for pound these machines might have more memory, this just slows them down.

Also, the vast majority of companies write software compatible with the entire range of a particular micro, so very few programs use the big machine's extra memory.

For a person who doesn't want to go heavily into machine code for programming, Archimedes Basic is possibly the best available.

Others aren't so good and, in fact, it would be an easier task trying to put toothpaste back into a tube than writing a program in Basic on some micros.

Many people have questioned the BBC's choice in sponsoring the Archimedes 300 series. Why shouldn't it? Aren't the other companies just a little bit jealous that the BBC went to Acorn's operating system and not some other well-known international one?

The Archimedes has the backing of a lot of good software houses and people like Watford Electronics making add-ons for it.

It will not be long before a very large software base becomes readily available.

The Archimedes is a complete micro system which can only be rivalled in terms of power by computers costing many times as much.

To compare it with a 16 bit micro is an insult to the Risc design team that produced a chip which worked first time with only half the manpower that it took to develop the 68000 (RIP) and yet the chip far surpasses its inferior competitors.

If you want a high-powered computer system buy the Archimedes, but if all you want is nothing more than a jazzed-up pocket calculator then buy an inferior cheap machine. – **Alpesh Patel, Wembley, Middlesex.**

Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Writers of the most interesting letters receive a £10 prize.

No go Mega Games

LAST summer I bought a two-meg 128k memory expansion board from Solidisk. At the same time I bought five discs of its Mega-Games program.

*After many abortive calls to Solidisk I cannot get these discs to run. On trying to load into a rom slot I get the message Bad program and other times I seem to need *PLAY.*

I am particularly disappointed as I wanted to use these programs at Christmas for my nieces and nephews. Solidisk now claims it can't be done. Can any readers help? – **D. Whitmore, Newport, Gwent.**

Crunching numbers

I WAS pleased to see my letter in the Number Crunching item in the Education section of the February issue of The Micro User.

However, and I apologise if it sounds a bit churlish, the program written by Christopher Murray was not a fair comparison with my own.

As you are probably aware, the target answer to the problem turned out to be the number 489, and this will be

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reached more quickly if you count down from 612 as Christopher did – rather than up from 1 – as I did.

I chose to count up so as not to take advantage of this fact.

However, if you change my FOR . . . NEXT loop so that it counts down, and then compare the time my program takes, the answer is only 1.04 seconds – nearly twice as fast as Christopher's program, but not as fast as yours. – **H.L. Smith, Woodbridge.**

● You're quite right – we were aware of it and wondered if anyone would notice. Our own program operated the same way, but the ultimate answer in the February issue was the complete general solution and worked faster than anything else.

£10 Prize letter

Z88 command performance

MANY thanks for extending your magazine's coverage to the Z88. I bought one shortly before Christmas and found it to be an excellent machine and I thought I'd share some interesting Basic wrinkles.

First, the version of BBC Basic is functionally the same as the Master's Basic 4. In addition to the LIST IF facility it also supports the ON..PROC construction – neither are mentioned in the User Guide.

Secondly – when you use GET, INKEY and so on – the cursor keys return different codes from those on the BBC Micro. However, you can still check whether they're being pressed: They put two codes into the keyboard buffer. The first is zero for them all and the second is as follows:

```
252 - left
253 - right
254 - down
255 - up
```

So something like the following can be used to check them:

```
1000 REPEAT UNTIL GET=0
1010 cur%=GET
1020 ON cur%-251 PROCleft
,PROCright,PROCdown,PROCup
```

Finally, the Basic also supports star commands and oscli. I've found five so far:

```
CLI
DELETE
ERASE
NAME
RENAME
```

DELETE and ERASE seem to do the same thing – delete a named file – in exactly the way that DELETE does with the DFS or ADFS.

*NAME produces an entry in the YOUR REF column of the Index popdown. This could be used by putting *NAME <program name> at the start of your listings so you can pick the right one from several suspended Basic programs in the Index.*

*CLI passes a string to the command line interpreter and is described on pages 198 and 199 of the User Guide. This could be very useful: As a trivial example, the statement *CLI #P in your Basic program will call up Pipedream.* – **Brian Stewart, Blackheath, Nr. Colchester.**

Good neighbours

A FRIEND of mine is a keen viewer of the popular soap Neighbours. *She informs me that a copy of* The Micro User *has been seen on a coffee table before, but January 19 someone was actually reading it.*

I wonder if anyone will ever be seen keying one of the listings into a BBC Micro. – **K. Hudson, Poynton, Cheshire.**

Stung by Barny

I'M close to failure in the eyes of my seven-year-old son. As a faithful basher of a Master Compact, with minimal knowledge of the intricacies of programming, my current library of The Micro User *games is now a respectable size.*

I regard the Checksums as the instant key to success – they deserve an Oscar – and thanks for the new version in the February issue.

But as far as Barny Bee from the January issue is concerned I have been unable to match lines 360, 410, 500 and 840 with the Checksum and have resorted to what must appear unorthodox modifications to run the program.

In line 40 I changed E00 to D00 to obtain room at line 640. I changed the last 2 to 200 in line 80 to stop the screen flicker and in lines 100 and 410 I followed Z with % to obtain valid variables and screen format of the Bee.

At line 360 I added spaces between the words and in line 500 I put : between them.

None of the changes made the listing fully compatible with the checksums, but it runs. – **C. Embley, Bromham, Bedford.**

● Barny Bee was incorrectly marked as compatible with the Compact in the article – but its nice to see that you have succeeded in getting it running. Well done!

Twentieth problem

WE have recently bought some chips from Computer Concepts and they all work fine except one – the InterBase address and mailing list.

The problem arises when I am typing in the twentieth or twenty-first entry when it comes up with the phrase "Bad pointer in key".

After this is thrown up the whole thing goes absolutely bananas and I have to type in the whole database again.

Can you help? – **Matthew Gates, Shirley, Croydon.**

● We'll have to throw this one open – any takers?

Basic Monopoly

I WAS pleased to see in the February issue of The Micro User *that Alison Winter is successfully running Monopoly on her Master 128.*

The software I wrote was on a BBC B with full compatibility in mind – just before the expanded versions came on the scene.

The problem with running games written specifically for the BBC B is that programmers sometimes do naughty things like poking code directly into the screen memory.

Although this method sometimes saves time and speeds up displays, it also makes the software incompatible for other machines with different screen memory locations. I don't know for certain, but I feel sure that this is the problem she is experiencing when she tries to run Scrabble on her machine.

Being a mere mortal and not having the capital to afford the new machine, I would be interested to hear from anyone who has tried to run Monopoly on the Archimedes, as there is no reason why the game should not run once you have loaded it. – **Brian Pearson, Cottingham, East Yorkshire.**

Spot the E fix the bug

JOHN Kelk's Variable Compression routine in the February 1987 issue of The Micro User *has a small bug in it that I found when compressing some number crunching programs – I've also found a fix for it.*

Very large or very small numbers are often represented in scientific or exponent notation: For example if BIG *is 123000000000 and* SMALL *is 0.00000000123 they can be written as 1.23E11 and*

LETTERS

1.23E-9 respectively.

The variable compression utility then replaces these with 1.23 E11 and 1.23 E-9 and Basic objects because of the included spaces or the sudden appearance of variables E11 *and* E.

The fix for this is to spot the E within numbers in the number *subroutine and to treat it as a valid digit. The modifications are as follows:*

```
3710 .number
3720 JSR update
3722 CMP #ASC"E"
3723 BEQ number \the fix
3730 CMP #48: ...
```

I hope this helps. – **Ray Wilson, St Albans, Herts.**

When a hyphen isn't

WHEN I type in some listings I occasionally come across a line which is not a hyphen, for example:

```
PROCexecute_line
```

Could you tell me which key the line character is on the BBC Micro and why the line is used rather than just leaving a space? – **A.M. Asquith, Maidstone, Kent.**

● This is the underline character which is located to the right of the up cursor key. It appears as a long hyphen – or dash – on the Mode 7 teletext screen. We cannot use space because Basic would get confused and generate an error.

Program downloading

I HAVE been attempting to download some telesoftware off MicroLink but the format has obviously changed since the article describing how to obtain it appeared in the May 1987 edition of The Micro User.

When I use the search option after selecting BBC I get a list of all the programs available. How do I abort this search? – **Geoff Hampton, from MicroLink.**

● The telesoftware section has been improved to make finding individual files easier.

Type TS at the system prompt and select the BBC telesoftware option. You are then presented with the prompt:

```
<S>earch <A>scii <K>ermit
<H>elp <Q>uit
```

First, you must search for the program. For example, to find Dino enter:

```
S Dino
```

confirming your choice at the Y/N prompt.

You can also use the same search procedure to find all the programs from, for example, March 1987 with:

```
S Mar 87
```

If you just enter S the full list of programs will be displayed. Once your program has been found, note the number, let's say F1004, and start the download procedure by typing:

```
A F1004
```

You can then proceed as usual. By using this method you shouldn't need to interrupt the program lists.

The fastest answer yet

LIKE many others, I was interested in Sarah Capper's homework problem published in the December 1987 issue of The Micro User.

After reading the round-up of replies published in the February issue and your statement that the fastest program you received took only 1.89 seconds, I decided to write in with my solution.

My one-line program generates fractions of successively greater accuracy until the required answer is obtained:

```
1INPUTZ:TIME=0:A%=1:B%=0:C
%=0:D%=1:E=1E_6:REPEATN%=I
NT(0.5+(B%_D%*Z)/(C%*Z_A%)
):T%=B%:B%=A%:A%=A%*N%+T%:
T%=D%:D%=C%:C%=C%*N%+T%:UN
TILABS(Z_A%/C%)<E:T%=TIME:
@%=0:PRINTA%"/";C%"=";A%/C
%TAB(30);:@%=&20209:PRINTT
%/100
```

This program finds the correct solution in 0.12 seconds.

On another note, have you ever been writing a program or typing one in and, after examining part of it, wondered what line number you had reached?

Or for that matter have you ever wanted to know how long a program is?

Try the following: Hold

Turn to Page 154 ▶

£10 Prize letter

Software aid to writing books

ONE of the arguments for use of micros in schools is that they can do things that cannot be done easily in any other way.

Unfortunately, many of the early number and word games for the BBC Micro needed a far greater ability to learn to use than the contents of the actual programs justified.

But word processing is different. Here we have a means of releasing some children from the shackles of the pen. The skills of draughting, editing and re-draughting are available in a worthwhile form for the first time in their lives.

Many children have struggled with a few sentences using only words they knew they could spell – in case they had to write them out again. The ability to save their thoughts on disc and revise work with the use of the word processor has given many a sense of self-respect for the first time.

For the more able it revealed abilities many of us had only guessed at. During an experimental piece of writing three or four years ago I remember explaining the limits of the computer's memory when using Wordwise to two 10 year-old enthusiasts writing a science fiction saga.

The current movement to have children produce their own real books has fresh impetus with the advent of Printmaster, Pendown, Toolbox, Folio, Typesetter and others. The arrangements for LEA bulk buying under the DTI scheme means that even primary schools can afford to avail themselves of these goodies and they have the advantage of being relatively easy to use.

Fleet Street Editor – a complete DTP system – is really for teachers only in most primary schools. Parents have admired my graphics but I don't pretend they are easily produced by children.

Cut and paste isn't just a facility in a Wimp system: It has a more down-to-earth significance in primary school book making.

Children like to mix and match. Headlines produced using the Printmaster's GPRINT option can be used with the fancy fonts of Pendown.

Primary age children find the large print of Folio easy to read. Typesetter produces a very dark print suitable for photocopying but it is incredibly slow to print out – half an hour for a page for its heaviest print.

While it is fairly easy for older children to plan their work and leave gaps for illustrations, we usually have to cut and paste to put the final edition on card and cover it with transparent PVA film – if it's worth doing at all, it's worth doing properly.

The volumes produced are used in the library – Richard's book on the visit to Wembley to see the schoolboy international has become a classic.

Publishing in our school is a powerful motivator for reading, writing and organisational skills.

Curiosity killed the cat, but it has enabled reluctant readers to get going. If that Richard can do it, so can I. – **Alan Clam, Head teacher, Wild Bank C.P. School, Stalybridge, Cheshire.**

LETTERS

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down Shift+Control – to prevent scrolling – and then press Escape twice. When Shift+Control is released the micro will print:

```
Escape
Escape at line xxxx
```

This works because Basic checks the validity of the program when an Escape occurs. As the first message is prevented from being printed immediately, when the second one occurs Basic thinks it was running the program, so it prints the last line number in the second message. – **Peter Clements, Barton, Torquay.**

A word in your ear

IN the February Letters Patricia Perris wanted a crossword puzzle generator – and you couldn't help.

Isn't the staff of The Micro User *talking to its colleagues on the* Electron User?.

If you care to pass the time of day with them, I'm sure one will point out that they published a perfectly good crossword designer and solver in the October 1986 edition of Electron User *and it works on the BBC B and BBC Master.*

I would also like to say that in most cases – except machine code arcade games – the programs in both magazines usually work equally well on both the BBC B and Electron. – **D. Shackleton, Wakefield, West Yorkshire.**

● You're quite right – we overlooked it and it's excellent. Back copies of *Electron User* can be obtained for £1.75 from Database Publications Ltd, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

Failed function?

BEING one of the people lucky enough to own an Archimedes, I used Daniel Tang's register loading routine published in your February issue.

Unfortunately it won't work because the ADR pseudo instruction appears to count each statement as one word when it calculates the relative address, and any function calls are just one statement. It looks like it's back to the long-winded way. – **Paul B. Nix, Woodsmoor, Stockport.**

● It's true that a function macro call only occupies one line, but it generates – in this case – two to five instructions.

But these will be correctly interpreted by the ADR instruction because it uses the relative memory locations – calculated from *P%* – not the number of lines in the program.

You should always write relocatable code – it makes things much simpler.

Master sprites

*IN reply to Nigel Garrett's letter in the February 1988 issue, you said you can only get sprites on the Master if you buy the Acorn Sprite Rom. You get a rom image of this on the Welcome disc but there aren't any other details with it. You use it just like GXR on the BBC Micro but without the *SPACE command.* – **R. Brumpton, Molescroft, Beverley.**

Search and replace

IN the February issue of The Micro User *you published the eagerly awaited machine code Checksums program. Unfortunately, when I typed it in it did not work and, not having a working version with which to detect my typing errors, I turned to my word processor, which rescued me very satisfactorily.*

Using a SPOOLed listing I was able to conduct a series of Search and Replace operations – searching for LDAs and replacing them with a blank. Having left the Confirm changes option set to On my attention was drawn to each LDA in turn and I was able to compare it with the printed listing before replacing with a blank.

It was laborious – 45 minutes – but my errors such as the remaining LAD (for LDA) and skploop (for skpLoop) emerged. Now I find the Checksums program works well. – **M. Palles-Clark, Reading, Berkshire.**

Pinball is wizard

WHEN I received the February 1988 issue of The Micro User *I was thrilled to find a faster Checksum program and Pinball.*

The first thing I did was to enter the Checksum program, and it worked perfectly. So I started the task of entering the pinball game.

The program checked perfectly as far as line 760, but line 770 caused immediate trouble – I just couldn't get the required checksum. I typed the line in four times without success.

I don't see why it shouldn't work, and all I can think of is that there must be a printing error in the line.

I can see no reason why my version of Basic and OS should affect the commands. I have Basic 1, OS 1.2. – **Gareth Moore, Farnborough, Hampshire.**

● The listing of Pinball is correct but we discovered too late that the checksums had been generated from a slightly different version.

The cumulative digit will be wrong from that line onwards but all the other line checksums are – apart from line 770 – correct. The checksum for line 770 should be D602 5.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

BBC Micro valuation

I AM just about to sell my BBC Micro together with lots of peripherals and software so that I can buy an Archimedes. I was wondering how much it was worth – it cost me £2,809. How much can I expect to get back? – **David Seymour, Chingford, London.**

● It's a very difficult thing to estimate – the Micro User Classifieds will give you a good idea of what you can expect to get for your equipment.

In general, software will not return very much whereas hardware will fetch about 50 to 60 per cent of the purchase price.

Z88 transfer software

I BOUGHT my Z88 before I saw the offer in The Micro User *and I notice that you supply a free BBC Micro-Z88 lead and transfer software with it.*

I am particularly interested in the software because you can transfer word processed text files from most of the well-known BBC Micro word processing packages, including Mini Office II which I have.

Is it possible to buy the software only? Could you please let me know how much it will cost and how to order it?

Could you also let me know how to join MicroLink? – **John Manley, Skipton-in-Craven, North Yorkshire.**

● The program you refer to only transfers from the Z88, although there is another utility on the same disc that archives the entire Z88 memory contents to a BBC Micro disc and vice versa. This program can also transfer single files.

The utility disc is available for £4.95, or £22.70 with the lead from the Z88 advertisement on Page 76.

The order form to join MicroLink is on Page 49.

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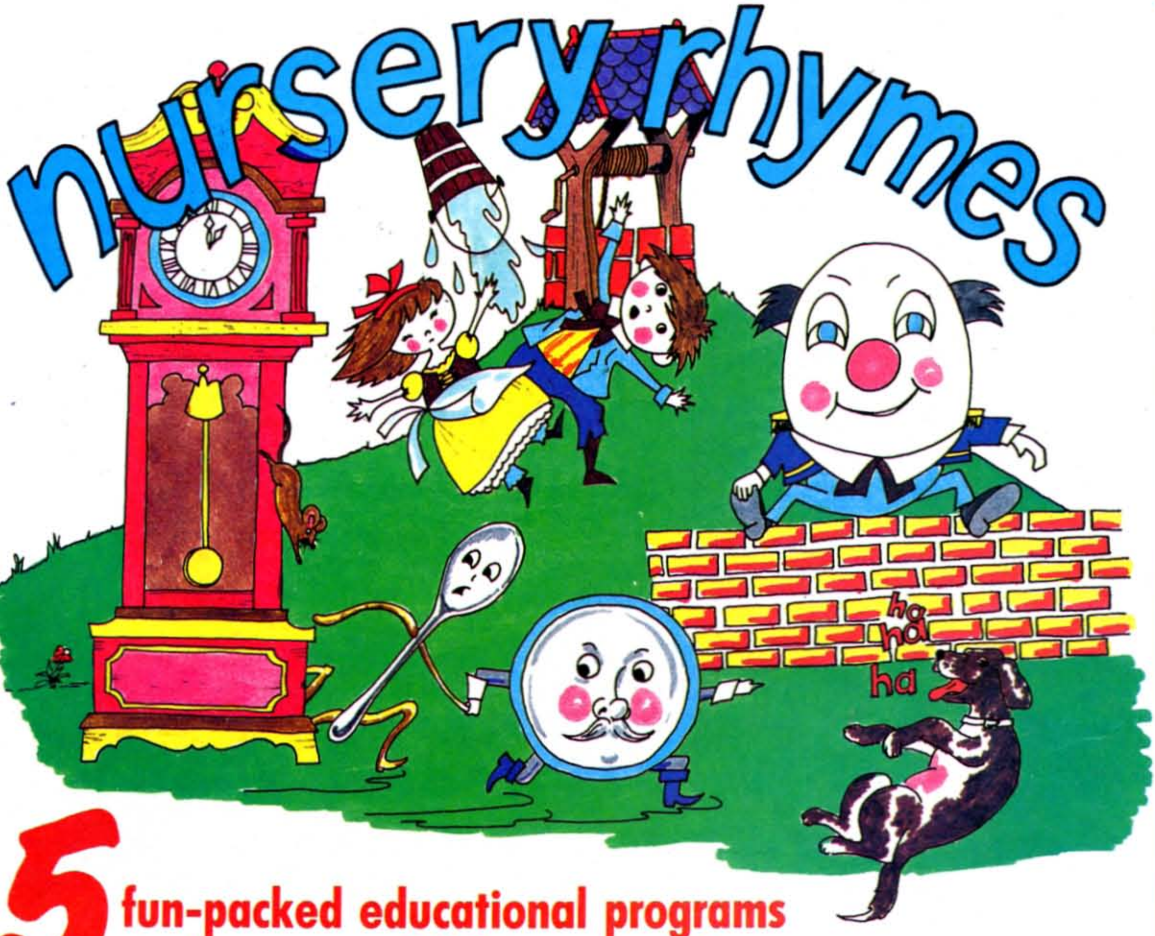

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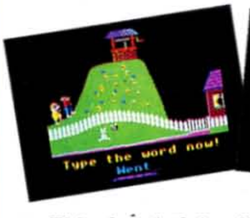
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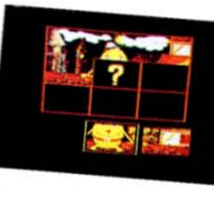

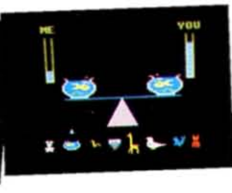

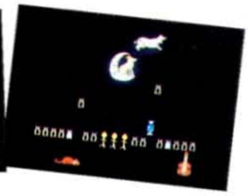

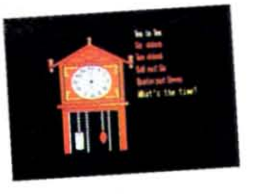
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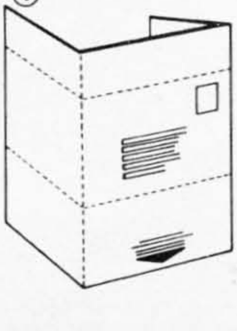

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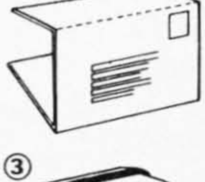

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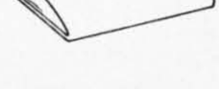

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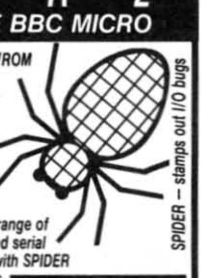
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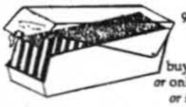

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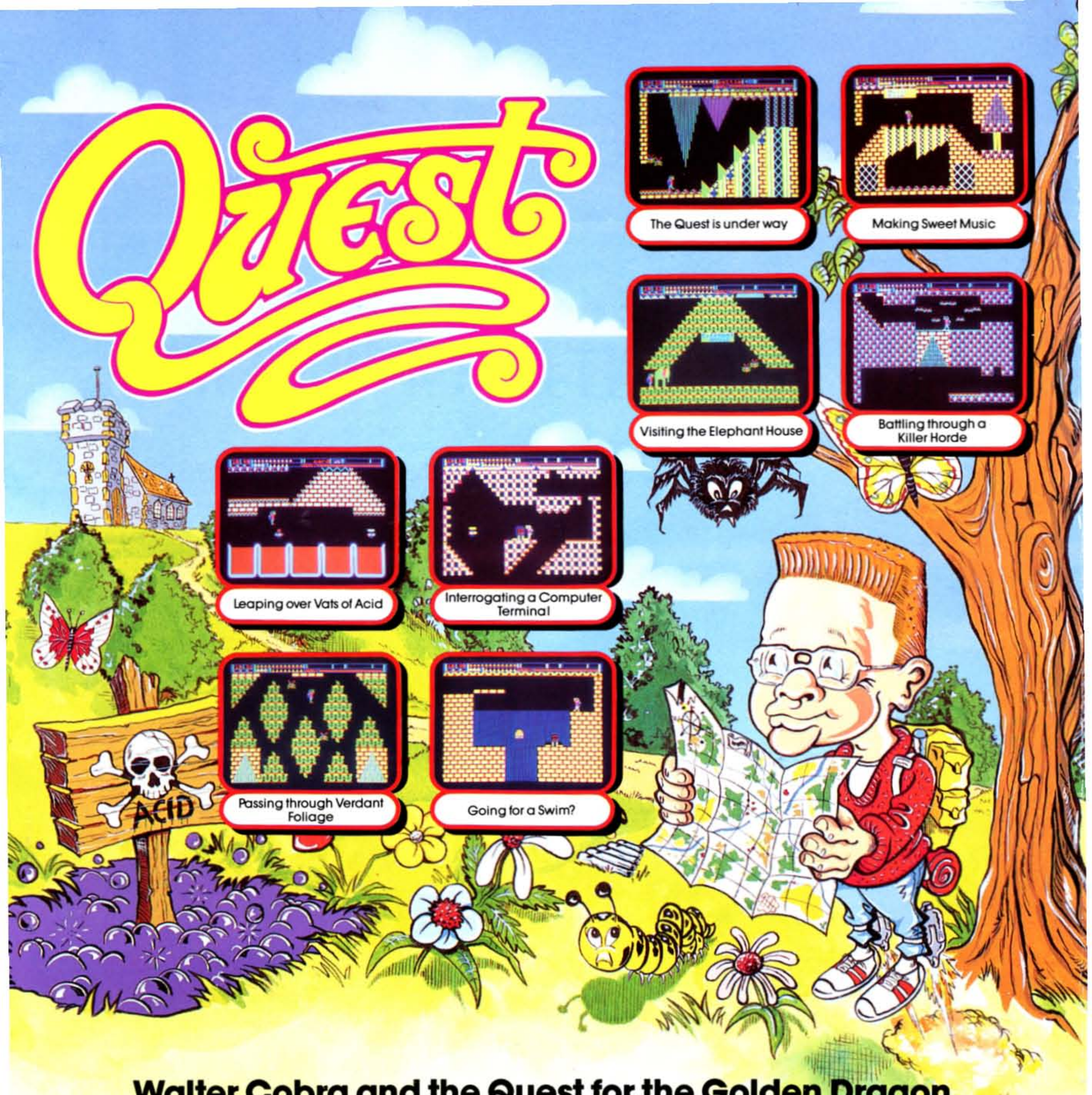
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